REPORT RESUMES

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REGIONAL CONFERENCE ON SUPPLY AND DEMAND OF TEACHERS OF OCCUPATIONAL EDUCATION IN THE SOUTH. CENTER SEMINAR AND CONFERENCE REPORT, NUMBER 4.
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TWENTY-EIGHT EDUCATORS, ECONOMISTS, AND OTHERS INTERESTED IN OCCUPATIONAL EDUCATION ATTENDED THE CONFERENCE TO CONSIDER (1) REGULATION, ORGANIZATION, AND ADMINISTRATION OF FEDERAL AND STATE AGENCIES, TEACHER TRAINING INSTITUTIONS, AND LOCAL SCHOOLS AS RELATED TO THE SUPPLY AND DEMAND OF TEACHERS, (2) OPERATION OF THE TEACHER LABOR MARKET AND SUPPLY AND DEMAND CONDITIONS FOR TEACHERS AT ALL EDUCATIONAL LEVELS, AND (3) EDUCATIONAL PLANNING. TEXTS OF FIVE PAPERS COMPRISE THIS REPORT. "EDUCATIONAL INSTITUTIONS AND THE DEMAND FOR OCCUPATIONAL EDUCATION PERSONNEL," PRESENTED BY CHARLES H. ROGERS, DISCUSSES ORGANIZATIONAL CHANGES AFFECTING THE DEMAND FOR OCCUPATIONAL EDUCATION PERSONNEL. THESE ARE INCREASED FINANCIAL SUPPORT, LESS TRADITIONAL OBJECTIVES AND APPROACH, INCREASED SPECIALIZATION, AND CULTURAL LAG. "EDUCATIONAL INSTITUTIONS AND THE SUPPLY OF OCCUPATIONAL EDUCATION TEACHERS," BY MERLE E. STRONG, PROVIDES INFORMATION ABOUT PRESENT PRACTICES, CERTIFICATION STANDARDS, CHANGES IN VOCATIONAL PROGRAMS AND TEACHER EDUCATION, COSTS TO STUDENTS, SUPPORT PROGRAMS, AND LEGISLATION AND INNOVATIONS. "SOME ASPECTS OF TEACHER SUPPLY AND DEMAND," BY JOHN K. FOLGER, REVIEWS THE SUPPLY AND DEMAND FOR ELEMENTARY, SECONDARY, AND COLLEGE TEACHERS, DISCUSSES TEACHER QUALITY, AND INDICATES SOME PROBLEMS IN STUDYING THIS SUPPLY AND DEMAND. "STAFFING JUNIOR COLLEGES," BY DAVID G. BROWN AND EDITH H. PARKER, DISCUSSES THE OPERATION, EFFICIENCY, AND IMPROVEMENT OF THE TEACHER LABOR MARKET. "EDUCATIONAL PLANNING," BY J. ALAN THOMAS, DISCUSSES THE ECONOMIST'S APPROACH TO EDUCATIONAL PLANNING BY THE USE OF THREE TYPES OF ANALYSES AND PLANNING MODELS. (EM)

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REGIONAL CONFERENCE ON SUPPLY AND DEMAND FOR TEACHERS OF OCCUPATIONAL EDUCATION IN THE SOUTH

LOREN A. IHNEN AND ADGER B. CARROLL
CONFERENCE CHAIRMEN
DEPARTMENT OF ECONOMICS
NORTH CAROLINA STATE UNIVERSITY AT RALEIGH

Center Seminar and Conference Report No. 4

CENTER FOR OCCUPATIONAL EDUCATION
NORTH CAROLINA STATE UNIVERSITY AT RALEIGH
1966

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF EDUCATION—BUREAU OF RESEARCH
DIVISION OF ADULT AND VOCATIONAL RESEARCH
PROJECT NO. DAVR 5-1005, CONTRACT NO. OE 5-85-107

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The Center for Research, Development, and Training in Occupational Education was approved and established as a Research and Development Center in 1965, under the provisions of Section 4(c) of the Vocational Education Act of 1963. The initial approval was for 20 months, ending 31 January, 1967. The proposal for the continuation of the Center for five years, beginning 1 February, 1967, has been approved and the continuation program is in operation. The total program, which has emphasized research in crucial problems in occupational education since its inception, has been divided into five complementary programs, including a research program, an evaluation program, a research development program, a research training program (in occupational education), and a services and conferences program. The Center is designed and organized to serve the nation, with special orientation to the southern states.

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REGIONAL CONFERENCE ON SUPPLY AND DEMAND OF TEACHERS OF OCCUPATIONAL EDUCATION IN THE SOUTH

LOREN A. IHNEN AND ADGER B. CARROLL

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CENTER SEMINAR AND CONFERENCE REPORT NO. 4

CENTER FOR OCCUPATIONAL EDUCATION

North Carolina State University at Raleigh

Raleigh, North Carolina

1966

Project No. DAVR 5-1005
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PREFACE

Expansions of programs of occupational education, both at the secondary and post-secondary levels, create demands not only for additional personnel, but also for personnel who have the combination of attributes -- including training and experience -- to perform effectively as instructors in emerging programs of vocational and technical education, especially at the post-secondary level. "Supply and Demand for Professional Personnel" is the title of a research project which has been undertaken within the Center of Occupational Education by Dr. Adger B. Carroll and Dr. Loren A. Ihnen of the Department of Economics at North Carolina State University at Raleigh. The conference reported herein was sponsored by the Center to provide an intellectually stimulating climate in which economists and vocational educators could highlight pertinent issues which are germane to this problem. The research report will be reported in a Center Research Monograph.

Appreciation is expressed to Drs. Ihnen and Carroll for their competent leadership in organizing the conference; to the members of the planning committee -- Professors Harry G. Beard, Robert A. Fearn and Durwin M. Hanson of North Carolina State University at Raleigh; and to the speakers -- Dr. Charles H. Rogers of North Carolina State University at Raleigh, Dr. Merle E. Strong of the U. S. Office of Education, Dr. John K. Folger of the National Academy of Science, Dr. David G. Brown and Edith H. Parker of the University of North Carolina at Chapel Hill, and Dr. J. Alan Thomas of the University of Chicago.

John K. Coster, Director
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PROGRAM 100

INTRODUCTION

There has been and is a widespread concern about shortages of teachers, i.e., insufficient numbers of well-qualified teachers at existing salaries. The general purpose of this regional conference was to assemble educators, economists and other persons interested in occupational education for a discussion of the general state of knowledge regarding supply of and demand for teachers, particularly occupational education teachers in the South.

It was anticipated that the discussion could not be confined exclusively to occupational education. Many theoretical concepts and much of the current research and literature relate to education and teachers in a general way. Nevertheless, to the degree made possible by previous literature and experience, the authors were encouraged to address themselves to occupational education and to the supply and demand for teachers of occupational education in the South.

Three major topics were considered at the conference. The first session was devoted to a discussion of the regulation, organization and administration of federal and state educational agencies, teacher training institutions and local schools as related to the demand for and supply of teachers. In the second session the operation of the market for teachers was discussed, and current and projected supply and demand conditions for teachers at all educational levels were reviewed. The final session was devoted to a discussion of educational planning. Dr. Grant Venn, who was originally scheduled to present a paper at the final session, was unable to participate in the conference because of illness.

As conference chairmen, we wish to express our personal appreciation to the authors of the papers and to all the participants at the conference. The array of penetrating questions raised during each discussion period was amazing and gratifying. Finally, we would like to express our gratitude to the planning committee for their efforts.

L.A.I.
A.B.C.

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EDUCATIONAL INSTITUTIONS AND THE DEMAND FOR OCCUPATIONAL EDUCATION PERSONNEL

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As our conference theme indicates, we are concerned here with the supply and demand for occupational education personnel. The economic law of supply and demand operates in the area of educational personnel just as it does in the production and marketing of other economic goods and services. Supply and demand work hand in hand and must be studied together to produce solutions to the ever-increasing personnel demands in our expanding occupational education programs. In order to solve some of the personnel problems, we must first understand the factors and conditions which affect both the demand for and the supply of occupational education personnel.

This paper will be devoted primarily to a description and analysis of the institutions and institutional arrangements which affect the demand for occupational education personnel. How has the organization of vocational and technical education changed in recent years at local, state, and federal levels? What new demands are being placed on the occupational education organization? What new institutions and programs are developing? Which vocational programs are growing most rapidly and why? What are the major occupational education trends influencing personnel needs? These are some of the questions that must be answered if we are to better understand the demand for occupational education personnel in the South.

At the outset, let me make it perfectly clear that I do not pose as an expert in the area of occupational education institutions and organization. However, during the past year Dr. H. G. Beard and I, under the auspices of the Center for Occupational Education at North Carolina State University, have been engaged in a study of policy, policy-making, organization, and finance of occupational education in the South. This has given us an opportunity to look closely at the organizational changes which are occurring across the board. In this study it was our plan to study the organizations for occupational education in each of the fourteen southern states. In planning and developing this study, much secondary data were secured and analyzed which has given us considerable insight into the organizational and institutional changes which have occurred over the past three or four years. Additional insights have been gained through a recent survey of organization and program changes in the southern states. Therefore, the planners of this conference have asked us to share with you some of our tentative findings relative to institutional changes which affect the demand for occupational education personnel.

Major Organizational Changes

The organization of occupational education is complex and is constantly changing as is any other large-scale organization. Therefore, I should like to deal largely with the *major* organizational changes which have occurred or are occurring that bear directly upon the changing demand for occupational education personnel in the South. The ensuing discussion will attempt to develop the following five points:

1. the increased financial support to expand the sheer size of the organization,
2. the change in objectives and approach from the traditional vocational subject-matter fields to serving groups of people in all occupations,
3. the increasing specialization of the occupational education organization,
4. the cultural lag between new and expanding programs and the services needed to sustain them, and
5. the status of the occupational education organization in the southern states with respect to personnel.

Increased Financial Support

I believe it is beneficial to go back to the latest public boost of vocational and technical education, the Vocational Education Act of 1963. Upon the recommendation of President Kennedy's Panel of Consultants on Vocational Education, legislation was passed by Congress which has had tremendous impact on occupational education from the federal to the local levels. Objectives of vocational education were broadened, new training programs were encouraged, new groups of people were to be served, and most of all, greatly increased funds were authorized to help the states expand, improve, and redirect their vocational education programs.

Increased federal funds have been one of the most important factors affecting the demand for occupational education personnel. Let us look for a moment at the increase in federal contributions to vocational education since 1963. In 1963 only $55 million of federal money was spent to aid state vocational education programs. In fiscal 1965 funds, in addition to these, from the Vocational Education Act of 1963 in the amount of $118,500,000 were authorized (Table 1). This immediately tripled the federal contribution to vocational education. During the current fiscal year (1966-67), the federal funds from the 1963 Act reached a maximum -- an additional $225,000,000 over the 1962-63 level. The federal contribution has increased over 500 percent since the enactment of the 1963 Act.

Table 1. Federal aid to vocational education

Year	George Barden-Smith-Hughes Acts	Vocational Education Act of 1963
	(dollars)	
1962-63	55,000,000	
1963-64	55,000,000	60,000,000[a]
1964-65	55,000,000	118,500,000
1965-66	55,000,000	177,500,000
1966-67	55,000,000	225,000,000

[a] Authorized by Vocational Education Act of 1963, but not appropriated.

The current federal funds must be matched on a 50-50 basis by state and/or local funds which has made it necessary generally for the southern states to increase their state and local contributions. However, in most of the states there had been overmatching of federal funds prior to the 1963 Act. This may continue to be the case. It is difficult to determine from existing records just how much overmatching is done. But, in any event, it is clear that substantially more federal, state, and local funds are being funneled into vocational education.

Let us look for a moment at the funds that are coming to the southern states. Table 2 shows the federal allocations by states and by year since 1964. Federal funds allocated to the 14 southern states have steadily increased from about $19,000,000 in 1965 to more than $70,000,000 in 1968. The sheer magnitude of the increase in financial support of vocational education is bound to result in a greatly expanded organization at all governmental levels. Any time that such an increase in funds is available to an organization, some sort of growth will surely occur, and the resulting growth will almost always be accompanied by the need for more personnel. We may not be able to look at increased financial support and determine what kinds of personnel will be needed, but I do believe that it is safe to assume that as funds for occupational education have increased, personnel problems have become more acute. When it comes to the kinds of personnel needed, factors other than availability of funds must be considered, which leads me to my second point.

Change in Objectives and Basic Approach

Perhaps a little light can be shed on the kinds of personnel that will be needed as we consider this point. New purposes to be served by occupational education, as well as new groups of people to be served, will ultimately affect the kinds of personnel needed.

Before 1963, vocational education meant occupational education in a limited number of specific fields (vocational agriculture, home economics, distributive education, trades and industries). The

Table 2. Tentative allocation of authorized federal funds to fourteen southern states, fiscal 1965 to fiscal 1968, under the Vocational Education Act of 1963[a]

States	1964-65	1965-66	1966-67	1967-68
		(dollars)		
Alabama	1,268,414	2,505,166	3,751,464	4,756,645
Arkansas	669,939	1,323,155	1,981,941	2,512,320
Florida	1,556,079	3,073,316	4,603,490	5,835,410
Georgia	1,546,666	3,054,725	4,575,642	5,800,110
Kentucky	1,163,400	2,297,760	3,441,792	4,362,835
Louisiana	1,214,104	2,397,903	3,591,795	4,552,980
Maryland	839,073	1,657,201	2,482,306	3,146,585
Mississippi	860,873	1,700,256	2,546,798	3,228,335
North Carolina	1,863,731	3,680,939	5,513,643	6,989,125
Oklahoma	843,440	1,665,826	2,495,224	3,162,960
South Carolina	1,010,796	1,996,362	2,990,331	3,790,560
Tennessee	1,374,089	2,713,879	4,065,093	5,152,935
Texas	3,327,550	6,572,039	9,844,194	12,478,555
Virginia	1,508,984	2,980,301	4,464,164	5,658,800
Total	19,047,138	37,618,828	56,347,877	71,428,155

[a] Amounts authorized reach a maximum in 1967-68 and are constant from this year on.

redirection of vocational and technical education, encouraged through the Vocational Education Act of 1963, has emphasized the serving of groups of people in all occupational areas as opposed to the support of specific occupational areas as had been done previously. The 1963 Act states, and I quote: ". . . so that persons of all ages in all communities of the State - those in high school, those who have completed or discontinued their formal education and are preparing to enter the labor market, those who have already entered the labor market but need to upgrade their skills or learn new ones, and those with special educational handicaps - will have ready access to vocational training or retraining which is of high quality, which is realistic in the light of actual or anticipated opportunities for gainful employment, and which is suited to their needs, interests, and ability to benefit from such training." This is a broad objective which touches occupational education needs that were not authorized under vocational legislation prior to 1963.

The purposes for which federal funds may be spent have also had an effect upon the kinds of personnel needed by the occupational education organization. Prior to 1963, reimbursable funds were used primarily for support of programs of vocational education in the high school in traditional service areas. These funds were used primarily for direct costs of instruction and supporting ancillary services. Since the 1963 Act, however, the purposes for which funds have been expended have been expanded considerably. Funds are now used for vocational instruction in all occupations in the high schools and in area schools, and for instruction under contract with private schools.

Funds are also available for construction of vocational facilities, and considerable emphasis is put on the need for area vocational schools. There is recognition that the area vocational schools have a very important part to play in serving the needs of occupational education. This is evidenced by the tremendous growth of area schools in the South over the past five years. Funds are also used to secure and maintain instructional equipment and teaching materials.

Funds are also available to remove special academic, socioeconomic, and other handicaps which prevent students from benefiting from regular occupational training. Special vocational programs have been developed for handicapped students in the high schools; remedial courses in communications, arithmetic, etc., have been developed to remove the handicap that interfered with normal occupational training; literacy training has been provided for adults who need it; and countless other programs have been developed to meet the special needs of specific groups of people.

I believe that we might safely say that since the 1963 Act, the southern states, as well as the rest of the nation, have made a conscious effort to remove primary emphasis from the traditional occupational service areas in order that consideration might be given to the total array of occupational education needs and to plan programs for those that are most pressing. It is interesting to note in this respect that the rules and regulations applicable to the use of funds from the 1963 Act earmark none of the funds for specific occupational service areas. The only funds that are still earmarked by services are those from Smith-Hughes and George-Barden Acts. Even here there are provisions for a state to transfer these funds to be used under the provisions of the 1963 Act. Now, it is quite possible for a state to have no funds especially earmarked for specific service areas.

As the vocational education organization moves toward serving new groups of people and toward serving new and expanded purposes, it is clear that a greater variety of personnel will be needed to support the organization. It appears that the personnel needed will have to be somewhat different from the traditionally trained vocational teacher. We are going to need more specialists in a larger sphere of activity as is indicated in the next point in this discussion.

Increasing Specialization

Not unrelated to changes in purposes and people to be served is the growing specialization of the occupational education organization which is providing the services. From our study of the southern states, thus far, it is quite evident that practically every aspect of the organization for occupational education is becoming more specialized. Specialization is occurring in teaching, in programs, in supervision, in administration, and in other ancillary services. I shall try to illustrate just how specialization is occurring in each of these areas, as well as to look at some of the changes that are occurring in the South which support this movement.

First, let us take a look at specialization in teaching. Prior to 1963, vocational education was comprised primarily of generalist vocational teachers, such as the vocational agriculture teacher, the home economics teacher, the distributive education teacher, etc. A notable exception was in trades and industries where some degree of specialization has been operative all along. But, even here more specific areas are being carved out, and numerous new areas added. Let us take for example what is occurring in vocational agriculture. Earlier the vocational agriculture teacher was responsible for providing training in the broad field of agriculture. He taught general agricultural skills centered around the work of the farm. This kind of teaching necessarily required a generalist. The trend now in vocational agriculture is the development of a series of teaching specialties. Along with instruction in farm occupations has come the need for numerous farm related (or agriculturally related, if you like) teaching specialties, such as ornamental horticulture, farm machinery maintenance and repair, agricultural marketing, agricultural sales, and many others too numerous to mention here. One teacher cannot be a specialist in all these areas; thus, specialized teachers are required. Such specialized teachers are now being sought throughout the South. I know for a fact that in my home state of North Carolina we are trying very hard to employ such specialized teachers in both the high schools and the area schools.

Another example that depicts this specialization trend is the new program in health occupations. In this program there must be specialized teachers for specialized laboratory technicians, practical nursing, nursing aids, dental technicians, and numerous other subprofessional health occupations. Home economics is also requiring special teachers for the variety of women's occupations for which training is now being provided in addition to training for the work of the home. New specialized training is being added to the distributive education area, to trades and industries, and to the technician training areas.

I believe that there can be no question about the fact that the day of the generalist vocational educator is about over. Increasingly, more specialized teaching personnel will be demanded in all occupational areas. To provide such personnel, however, will place upon the occupational education establishment tremendous pressure to procure or recruit and train those needed in these many specialty areas. Some of the problems related to this will be discussed a little later.

While discussing teacher specialization, I have alluded to program specialization several times. Therefore, I will review briefly some of the newly specialized programs that are now developing in occupational education in the South. I recently sampled the southern states to see what new occupational education programs had been added since 1963. The following are some of the new programs that have been added. I call your attention to the specialized nature of most of them.

Office Occupations
Homemakers Service Training Programs
Cooperative Home Economics Wage Earners Classes
Vocational Guidance in the Trade Schools
Guidance Services for Elementary Schools
Agribusiness Programs
Introduction to Vocations
Agriculture Sales and Services
Marketing
Ornamental Horticulture
Special Needs Programs
Data Processing
Furniture Manufacturing
Technical Nursing
Nurses Aid Training

One respondent to the survey indicated new specialized programs too numerous to list.

It appears that specialized programs are current realities and that the future prospects are for the trend toward specialized programs to continue at an intensified rate. Therefore, the greater the specialization of programs, the greater is the need for a variety of specialized teaching personnel.

What, then, happens to program supervision when programs become more and more specialized? It logically follows that if supervision is to be meaningful, it too must become more specialized. Furthermore, as the number of specialized programs increases, there will undoubtedly be a need for a much greater number of supervisors than ever before. A sampling of the southern states provides ample evidence that this trend is developing very rapidly. In state departments of education alone, anywhere from six to twenty-eight new state-level supervisors have been added to occupational education divisions over the past two to three years. Although I do not have specific evidence, I am guessing that more local and area supervisors are also being added.

Similarly, specialization has also invaded the ranks of administration in occupational education. It too is becoming more and more specialized -- specialized in the sense that there are more specialized administrative functions to be performed which require special knowledges and skills.

Let us look at administrative specialization for just a moment. Let us take, for example, the position of the state director of vocational education. How has this position become more specialized? In years gone by when budgets were developed and administered by the various vocational services, the director's major responsibility was that of giving overall direction to the entire program. He was expected to have a good understanding of all the services and how they fitted into the total vocational program. The organizational setup was very simple. We had a director of vocational education and directly underneath him was a head state supervisor for each of the various services. In those days the director's vocational qualifications were perhaps more important than his administrative qualifications.

Recently, the situation has changed. The sheer number of new services under his direction makes it impossible for the director to be completely knowledgeable in all the areas, and no one expects him to be. His state supervisors are the vocational specialists, and his specialty becomes that of coordination and administration.

There is a trend for the financial aspects of vocational education to be moved from the head state supervisor's office to the director's office, and with the many programs for which fiscal control must be provided, finance specialists are needed. It is not unusual to find in the director's office several staff members carrying out administrative functions. A review of the latest state plan depicts the administrative staff of a typical director's office something like this: the director of vocational education, an associate director, one or more assistant directors, an administrative assistant, and a financial specialist.

It is taking more people to perform administrative functions, and administrative positions are becoming more and more specialized. In many cases the positions cannot be filled adequately by traditionally trained vocational personnel. They require a different kind of specialization. For example, the associate director may have a background in educational administration, the assistant directors might have backgrounds in program planning or adult education, the administrative assistant might have a business education background or be a graduate of a two-year business school, and the financial specialist may have a background in accounting or business administration. All of these are administrative specialties rather than occupational education specialties. I believe that the time is close at hand when we may find that few people in the director's office will have traditional vocational education backgrounds.

At the local and area levels, a similar trend is occurring. A review of state plans indicates the creation of a position called "local director of vocational education" who serves a similar role at the administrative unit level as the director at the state level. As local programs of vocational education expand, and larger numbers of specialized programs are added, the need for coordination and articulation increases. These too are specialized administrative functions and require specialized personnel to perform them. Area vocational schools are faced with the same problems which require specialized administrative personnel of various kinds.

The major point to be made here is that a variety of administrative functions are being required at all levels in increasing numbers, and the specialized nature of these functions will require persons with quite different kinds of training and backgrounds than has been required of vocational education administrators in the past.

There is one other kind of specialization that I would like to mention -- the specialization of other ancillary services. Let us look first at the state level once again. Here we find new specialized ancillary services being added, or old ones being expanded. Research has just recently come to the forefront. Practically every state now has a

Research Coordinating Unit. Some state departments of education have built-in research sections. Centers for research in occupational education are developing across the country, one of which is located in the South. All these research efforts require specialized research personnel in increasing numbers.

Curriculum and instructional materials laboratories are noticeably developing and expanding in both state departments of education and on college campuses across the South. Specialists in curriculum development, instrumentation, communications, and audio-visual devices are needed.

Vocational guidance and counseling is also growing at quite a rapid rate. The only deterrent to growth in this area is the lack of qualified personnel. Efforts are now being made to establish guidance programs in the elementary schools and to substantially expand the guidance services in the high schools and area schools.

The last ancillary service I would like to discuss is teacher education. I do not intend to get into the adequacy or inadequacy of these programs to produce needed personnel because that, I am sure, will be covered by Dr. Strong when he discusses the institutions and institutional arrangements which affect the supply of occupational education personnel. I only want to look at teacher education because it too requires occupational education personnel.

There is considerable interest in the expansion of teacher education throughout the southern states. As new occupational education programs are added, teaching personnel must be provided. Until programs of teacher training are established, interim measures must be taken to qualify personnel to work in new programs. Retraining and in-service programs are used to fill in the gap. As greater numbers of new programs appear on the scene, this kind of training will become more important. This then will call for a different kind of educational specialist at the state level, one who is specialized in in-service educational programs. State departments of education now find themselves with this responsibility every time a new program is established.

Across the South, teacher education is growing in practically all occupational areas. Without a doubt, the fastest growing programs are in the areas of industrial and technical education. This, of course, stems from the fact that more and more industry is moving to the South and from the traditional lack of industrial and technical education opportunities here. Specialized personnel are definitely needed in these important teacher training areas.

As is evidenced here, specialization is invading practically every aspect of the occupational education organization. I am confident that this trend will continue. This trend is bringing with it a tremendous demand for a large variety of specialized personnel. Specialization is perhaps one of the most important factors that must be dealt with in supplying needed occupational education personnel in the future.

The Cultural Lag

In view of the push with more money, and in an effort to serve all groups of people in all occupations, and in view of the specialization that these have entailed, there is a cultural lag -- that is, a systematic supporting service to recruit, train, and replenish the supply of personnel has not developed as fast as expansion and specialization of programs. This, however, is to be expected. Ogden's theory of cultural lag is operative here just as it is with industrial expansion. Ogden's theory postulates that supporting or social services lag behind production.

Let us look for a moment at cultural lag and see how it has been operative in some of our southern communities. The movement of a rather large manufacturing plant into small towns will provide a good example for illustrating the cultural lag problem. Let's say this small town has a population of 1,000 persons, and the new manufacturing plant is designed to employ 800 to 1,000 new people. People may be employed and production begun, but the supporting services of the small town would be woefully inadequate for a long time under normal circumstances. First of all there would be a housing shortage, and even when adequate housing was provided, public utilities to support the increased population would be inadequate. Recreation facilities geared to a small population would be inadequate. The schools and churches would be inadequate as would be police protection and numerous other community services. It is easily seen in this situation that it would take considerable time and effort for the needed services to catch up with production of the new industry. Industry has not been unaware of this lag, for it tries to select communities in which to locate which promise the least amount of cultural lag. At best, however, there is always some cultural lag.

How has or is cultural lag affecting the occupational education organization? The program (or production) is growing much more rapidly than the supporting services. The need for new and specialized kinds of personnel is growing much more rapidly than teacher education programs can be developed to produce them. Even if teacher education programs were begun at the same time new occupational education programs were established, it would still take two to four years to produce the first teachers.

What then has the occupational education organization done to secure personnel? One major result of this lag is the general reduction of emphasis on professional teacher preparation and increased emphasis on technical competence. This change has pushed the occupational education organization to look for technical specialists wherever they can find and give them a minimum of professional training before putting them on the job. It is thought that if they have the technical competency, they may develop professional skill on the job through experience and through in-service education programs.

Traditionally, colleges and universities have required that their teaching personnel have technical or subject-matter competence; no professional education has been required. The high school programs, for the most part, have required considerable professional education along with technical preparation prior to entrance into teaching. The area schools, on the other hand, have tended to split the difference between the high schools and the colleges, employing certain kinds of personnel with professional education training and others with only technical competence. Generally, the professional education requirements are certainly less rigid in the area schools than in high schools. In some programs in the high school, the professional education requirement is also de-emphasized in favor of technical competency. This is especially true in the area of industrial education.

Cultural lag has had much to do with this situation. It has put considerable pressure on the professional education certification requirement, perhaps lowering it or at any rate changing it considerably. The demand for certain kinds of teaching personnel has caused the occupational education organization to look to new sources of teaching personnel, as well as new methods of preparation for teaching. Work experience and technical qualifications are tending to replace the professional requirements. Much of the professional education is left for on-the-job training and in-service education programs.

Another thing that the occupational education organization has done is to create temporary or provisional certification. With such great demand for personnel, persons with technical competence may be given temporary certification for a given period of time until professional requirements for permanent certification can be met.

Interim certification is given in cases where a new program requires certification for which no training program has been established. Thus, some teachers may be certified on the basis of short-term retraining programs and in-service education until such time as a pre-service training program can be developed. An example of interim certification comes from North Carolina and its new course in group vocational guidance, Introduction to Vocations. This program got started without fully certified teachers; therefore, interim certificates were issued to these teachers for a period of two years during which a pre-service program was developed to train teachers from that point on. Another point that was mentioned earlier but should be re-emphasized here is that state education department personnel are getting more and more involved in short-term, in-service education programs to help bridge the personnel gap between new and expanded occupational education programs and pre-service programs to train needed personnel.

Cultural lag in education must be considered as a major factor affecting the demand for personnel. It says much about how we will recruit, replenish, train, and certify teaching personnel.

Occupational Education Organization

In these final few minutes, I would like to present to you a glimpse of the occupational education personnel situation in the southern states. A survey of directors of vocational education has produced the following findings:

Adequacy of Personnel. In no occupational education area is there an adequate supply of teaching personnel. In better than 75 percent of the states there was an inadequate supply of teachers in all areas ranging from moderately to extremely inadequate. Trades and industrial education and technical education were found to be the areas of greatest inadequacy.

Program Growth Rate. Trades and industrial education and technical education were found to be the fastest growing areas. Home economics and vocational agriculture share the slowest rate of growth.

Recruitment. About one-half the states indicated that they had to go out of state to secure personnel. Agriculture and technical education were the areas most often named. Recruitment of personnel from business and industry is becoming more extensive than in the past. Teaching personnel are recruited from business and industry in the following areas: home economics, technical education, trades and industries, health occupations, office occupations and distributive education.

Summary

It has been the purpose of this discussion to describe and analyze institutions, institutional arrangements and changes which affect the demand for occupational education which in turn creates the demand for occupational education personnel. I have attempted to explain some of the major changes in the occupational education organization which seem to have greatest impact on the demand for occupational education personnel. The following summary comments appear to be most relevant to the work of this conference.

Vocational and technical education seems to be operating much like a large-scale, formal, complex organization in modern society. Its product is much in demand. Society is demanding occupational training for more people in a greater variety of occupational areas. This organization has public support which is evidenced by greatly increased financial aid. Therefore, the organization must change to meet public needs. In doing this, it is becoming more specialized, requiring more specialized teaching, more supervision, and more administrative coordination.

It is difficult to expand and redirect on-going programs in the field and at the same time build systematic, well-organized services to recruit, train and place personnel needed in the changing organization which has been described. The characteristics of the organization affecting demand discussed in this paper, plus other relevant factors, must be studied thoroughly as a basis for developing the services needed to supply the expanding number of personnel needed in vocational and technical education.

EDUCATIONAL INSTITUTIONS AND THE SUPPLY OF OCCUPATIONAL EDUCATION TEACHERS[1]

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I am pleased to participate in this conference relating to the supply of occupational teachers. Teacher education is among the most important considerations we face in vocational education. This is not just my opinion but is also the opinion of vocational educators across the nation. In virtually every state and at every level, lack of qualified personnel is said to be the number one problem. I wish to congratulate the North Carolina Center for Occupational Education for bringing together this group of educators, economists and other persons interested in occupational education to study this problem.

The Panel of Consultants in our last evaluation directed their attention to teacher education as a major concern--and I suppose that there is no reason to believe it will not be a point of issue in our next evaluation.

They said, "Teacher education is directly related to the effectiveness of the entire vocational education program. Larger numbers, more selective recruitment, and better preparation and in-service training of teachers must be achieved. High occupational competency is demanded of vocational teachers; the schools must, therefore, compete with the higher salaries and other benefits offered by business, industrial and agricultural enterprises." They went on to say this problem is more acute in the case of vocational teachers than of teachers generally. The continuous need to upgrade and update the occupational competency of teachers is also acute in vocational education.

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[1] This paper is a summary of the presentation by Dr. Strong.

The meaning of occupational education and occupational teachers was of some concern to me as I faced the task of preparing these remarks since some persons are using these terms rather broadly. To identify a little more clearly the teachers I will talk about, the following definition will be used.

An occupational teacher is one who functions in providing instruction in skills and/or knowledge relating to a specific occupation or cluster of occupations to persons who have made an occupational choice.

Present Practices

In order to think intelligently about the supply of occupational teachers, it would seem necessary that we look at the present practices used in securing such teachers. In doing this, it immediately becomes evident that practices have differed among the various service categories.

Traditionally, for example, the recruitment and training of agricultural teachers has been quite different from trade and technical or health occupations teachers. While many commonalities exist in the needs of teachers among what were the traditional service categories of agriculture, home economics, distributive education, etc., there are also differences.

Let's look briefly at some of the differences in teacher education in various services in terms of the ways that teachers have traditionally been trained. At the risk of oversimplification, I would like to use a concept that helps to clarify these differences for me, and I think it points to some implications for training of teachers in all of our fields. Let's divide the training of a teacher into three broad categories--technical, professional and general. Let me first illustrate by using the mathematics teacher. The mathematics teacher fits into a neat category with a four-year curriculum. His technical preparation is really the courses that he would take in mathematics. His general would be the history, English and other social science courses and the like. His professional preparation as a teacher would be methods and other pedagogical type courses. Using this, then, as a base, let's take a look at a home economics teacher. Here we find an approach that is about the same. Again you have a fairly neat four-year curriculum. The technical, as I see it, would be the skills and knowledge related to homemaking, the general would be the same as the mathematics teacher's or similar, the professional would be the how to teach--materials, methods, and the like. In the home economics area each of the girls being taught is living in a home, or has lived in a home. The home is, in part, a training laboratory for the teaching of this person.

Let's contrast this with the trade and industrial teacher. Here we have a problem of generalities because we are talking about a broad range of occupations, so let me be specific. Let's talk about the plumbing instructor. Traditionally, he has received his technical training as a result of on-the-job experience. We have usually had to settle for whatever he had along the line of general education which might have been just a high school diploma. In terms of his professional education, here too, we have had to settle for minimum preparation when he started teaching, with the immediate impact of teacher education directed toward professional preparation in-service. Hopefully, the person could be encouraged to work toward a degree after he was employed as a teacher.

In health occupations it has been the practice to select a person with training and experience in the specific field, for example, the Registered Nurse for practical nursing, the assistant for the dental assistance program, etc., and to then provide them with the skills of teaching.

The point I would like to make is that it appears to me to be sound to consider alternate ways to provide the technical and skill competence needed for teaching other than through a college curriculum for many of the teachers we are talking about. Following our traditional practice of recruiting from business or industry, for some vocational categories of teachers, it might be said that there is no shortage of potentially qualified persons for teaching if we can compete with business and industry in terms of salary and other benefits. Persons recruited must, of course, be given training in the professional education courses and, as is currently the practice, should be encouraged to pursue degrees in education.

Certification Standards

If one were to refer to the latest edition of the "Tabular Summary of Certification Requirements for School Personnel in the United States," published by the National Commission on Teacher Education and Professional Standards, he would immediately get the idea that all secondary teachers must have a baccalaureate degree in order to be certificated to teach in a secondary school in any state in the nation. This is not the case. I am not aware of any state in which certain vocational teachers, including those in the trade and technical areas, cannot be certified with less than a B.S. degree. In at least one state, office occupations teachers are being certified to teach at the secondary level without degrees. At the post-secondary level, there is even more flexibility.

I would make a plea that certification requirements be kept flexible in order that persons with competencies acquired through other than a four-year program in a college of education might be recruited into teaching.

There have been criticisms of the lengthy occupational requirements of some states for trade and technical teachers. Here the emphasis must be placed on occupational competence no matter how acquired rather than on years of experience if we are to attract the most competent teachers. A sound testing program to measure occupational competency would be highly desirable.

Implications for Changes in Teacher Requirements

Increased technological advancements, along with other factors, have changed the nation's occupational structure. The Vocational Education Act of 1963 reflects these changes in providing for new kinds of programs.

The following new dimensions call for significant program change which directly affects teacher education programs:

(1) The addition of office occupations to vocational education,

(2) Provision for distributive education as a preparatory program,

(3) Provision for programs for gainful employment as a part of home economics,

(4) Emphasize on programs for disadvantaged youth, and

(5) Provision in the Act to support instruction in content as a part of the teacher education program.

Institutions

A total of 109,136 teachers were employed in vocational-technical education programs in fiscal year 1965, an increase of 24,034 over 1964. In this same fiscal year approximately 600 institutions received assistance from vocational education funds. Turning to institutions in the South, data on the number of approved teacher education institutions by state are presented in Table 1, and colleges and universities providing teacher education programs in three vocational education fields are listed in Table 2.

Cost

There is no question that the cost of pursuing higher education is rising. Costs in general are going up. Colleges and universities face increasing costs of construction and operation. Salaries of teaching personnel are rising. In general, a good portion of the increase is being supported by public funds so that the cost of room and board is the greatest cost for public institutions and approximately equals the other costs in private institutions.

The June 1, 1966, issue of Forbes includes an article entitled, "The Affluent Professors." A subtitle states ". . . one reason college costs so much is that teachers don't like frayed collars."

Table 1. Number of approved teacher education institutions[a]

State	Types of accreditation		
	State Department	Regional Association	NCATE
Alabama	21	18	8
Florida	12	12	5
Georgia	27	26	8
Louisiana	19	17	8
Mississippi	16	13	5
North Carolina	33	33	14
South Carolina	22	18	1
Tennessee	31	28	8

[a] Source: U. S. Office of Education, Division of Vocational and Technical Education, Program Services Branch, September 1966. Statistics from: "Manual on Certification Requirements for School Personnel in the United States," 1964 edition. Published by National Commission on Teacher Education and Professional Standards (National Education Association of the United States).

Table 2. Colleges and universities approved by state boards for vocational education to provide teacher education programs[a]

State and institution	Trade and industrial	Distributive education	Agricultural education
Alabama			
Auburn University			x
Tuskegee Institute			x
A & M College	x		x
Univ. of Alabama	x	x	
Florida			
Univ. of Florida			x
Florida A & M	x		x
Univ. of S. Florida		x	
Fla. Atlantic Univ.		x	
Fla. State Univ.	x		
Univ. of Miami	x		
Georgia			
Univ. of Georgia	x	x	x
Ft. Valley College (St.)			x
Kentucky			
Univ. of Kentucky	x	x	x
Louisiana			
Louisiana State Univ.	x		x
Univ. of Southwestern La.	x		x
Southern Univ.	x		x
Northwestern St. Col.	x		
Mississippi			
Mississippi St. Univ.	x	x	x
Alcorn A & M College			x
Jackson State College	x		
North Carolina			
N. C. State University	x		x
N. C. A & T College			x
University of N. C.		x	
South Carolina			
Clemson Univ.	x		x
S. C. State College	x		x
University of S. C.		x	
Tennessee			
Univ. of Tenn.	x	x	x
A & I State Univ.	x		x
Memphis State Univ.		x	
Virginia			
Va. Polytechnic Inst.	x	x	x
Va. State College	x		x
Richmond Professional Inst.		x	

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[a] Source: U. S. Office of Education, Division of Vocational and Technical Education, Program Services Branch, September 1966.

> Since 1950, the average price of food, clothing, shelter and a new car has risen by 22 percent. In the same 15 years, the average total cost of attending college has risen by nearly 60 percent. That's with few frills and fringes.
>
> Tuition and fees alone, which can come to more than 50 percent of the cost of going to a private university and 14 percent of the cost of going to a public one, have risen by more than 90 percent.

The worst is yet to come according to this article with the average cost of tuition, room and board rising at a rate of about 5 percent per year.

Figures on annual costs (taken from U. S. Office of Education tables) are presented in Tables 3 and 4. It should be kept in mind that these are average, and that a student might spend from $500 to $3,500, it is said, depending on the school he attends, its distance from home, whether or not he has a car and other factors.

Scholarships and Other Assistance

While the chief source of funds for most students seeking to become teachers will be from their parents and their own savings, other forms of assistance are available usually through the college or university including academic and general scholarships, grants-in-aid, student loans and part-time work. As one who borrowed $50 from my English teacher to pay for my first quarter's college tuition, worked at three part-time jobs during my first year in college, and then continued to find a way to complete a Ph.D. while raising a family which numbers eight children, I am convinced that any average or above average student can find a way to attend college with the help that is available. I will mention only a few of the sources of assistance which are currently available.

Table 3. Average annual tuition and fees in the Southeast

Control of institution	Universities	Liberal arts colleges	Technological schools	Junior colleges	Teachers colleges
			(dollars)		
Public	255	195	312	114	193
Private	975	559	1,050	396	300

Table 4. Average annual room and board charges

Type of institution	Control of institution	
	Public	Private
	(dollars)	
Universities	690	829
Liberal arts colleges	549	675
Teachers colleges	562	681
Technological schools	698	775
Junior colleges	548	509

National Student Loan Insurance Program. This is the act of 1965 which will guarantee loans for vocational students up to $1,000 each year for 2 years for students whose family adjusted gross income is less than $15,000. The federal government will pay interest up to 6 percent while the student is in school and up to 3 percent during the repayment period.

College Work-Study. This is a program of employment for students of low income families. Such students are potentially eligible for employment by their colleges under the federally supported work-study program. Students may work up to 15 hours per week while attending full-time school and up to 40 hours per week during vacation periods. While the basic pay rate is $1.25 per hour, up to $3.00 per hour may be paid for highly specialized work.

Education Opportunities Grants. This is a program of direct awards which will be available in the fall of 1966 to a limited number of undergraduate students with exceptional financial need who require these grants to attend college. Grants will range from $200 to $800 per year.

Guaranteed Loans Program. This program is similar to the loan program for vocational students except that it is for all students. Graduate students may borrow up to $1,500 per year and undergraduates $1,000 per year. Students from families with an adjusted annual income of $15,000 or less pay no interest while enrolled and about half of the interest during the repayment period.

National Defense Student Loans Program. This program provides loans through colleges and universities of up to $1,000 per academic year to a total of $5,000 for undergraduate students. Graduate students may borrow as much as $2,500 a year to a maximum of $10,000. Repayment period and interest begins 9 months after the student ends his studies. The interest rate is 3 percent, and repayment may be extended over 10 years. If the borrower becomes a full-time teacher, up to half of the loan may be forgiven at the rate of 10 percent for each year of teaching. Borrowers who elect to teach in certain eligible schools located in areas of primarily low income families may qualify for cancellation of their entire obligation at the rate of 15 percent per year. Here is a way for certain teachers to actually get their college education with little or no cost.

Innovations in Vocational Teacher Education

I would like to say a word or two about what I think are some innovations in teacher education. I shall mention only a few. One of particular interest to me, and I think of interest to many of you in the South, is the project sponsored by the Oak Ridge Associated Universities in cooperation with the University of Tennessee and the Union Carbide Company, the prime contractor for the Atomic Energy Commission at Oak Ridge. This summer there was a program which was directed toward upgrading of the technical and professional skills of trade and technical teachers. This fall there is to be an academic year program providing again for the upgrading of both technical and professional skills. The project is unique because it is the first time that we have had an experimental program with industry on an organized basis to provide technical skill training for groups of students. The Atomic Energy Commission and the Union Carbide Company have the facilities, and they have the skilled personnel. The University of Tennessee is providing instruction in the professional courses. I think this project has many implications for what might be done in other industries.

There is the whole question of economics of this approach. In the next few weeks there will be an evaluation group taking a look at what happened during the summer program and projecting changes that ought to be made in the next summer's program, i.e., taking a look at the project's economic efficiency. I think there is no question that this approach can be useful. The question is, what is the best and most economical approach?

Rutgers University had a project in which they developed the plans for a center devoted primarily to the upgrading of competencies of vocational teachers in all fields. The plan provides for a facility where industry can bring equipment and new materials. The facility is planned to be used for both short-term and long-time programs. There will be a center for curriculum development as well as adequate audio-visual equipment including the latest innovations. In other words, it is planned to be truly a center for experimentation and demonstration in providing sound teacher education with emphasis on upgrading skills. Hopefully, funding will be found to construct the center.

The University of California has redesigned their summer teacher training program, and I think it has real merit. They have done away with the conventional course approach and have developed an instructional package which cuts across traditional areas in the organization of its content. It is not possible to describe in 30 seconds or so, but the program involves large group sessions for presentations and demonstrations, and small groups for other activities. The content is integrated in such a way that it should be more meaningful to new teachers than content taught by use of the traditional professional courses.

The cooperative approach of teacher education is being tried in many states. This is not a new approach. It has been going on for the last twenty years. I think it has some real promise, and we ought not to be looking at why such programs were unsuccessful before, but what we can do to make them succeed. I think it is a real good way to approach teacher education, i.e., another possibility.

Kentucky is talking about an associate degree for vocational teachers, particularly trade and technical teachers. This approach should provide an intermediate goal and professional recognition for persons recruited from industry.

Expenditures for teacher education have increased from about $6,000,000 in fiscal 1961 to almost $9,500,000 in fiscal 1965 (Table 5). Enrollments are also increasing with a total of 38,000 in fiscal 1961 and 69,000 in fiscal 1965, which is a pretty great increase (Table 6). You can see that the enrollment increases are greater in some areas than they are in others.

Table 5. Expenditures for teacher education[a]

Item	Fiscal 1961	Fiscal 1964	Fiscal 1965
		(dollars)	
Total	6, 049,011	8,018,878	9,438,968
Agriculture	2,185,729	2,525,314	2,513,073
Distribution	315,945	387,060	603,532
Home economics	2,134,201	2,709,500	3,418,878
Trade and industrial	1,059,032	2,104,670	1,971,256
Health		52,602	38,647
Technical		239,724	355,888
Office			456,162
Guidance			44,477
Amount reported by Connecticut with no break-down by program			37,055

[a] Source: U. S. Office of Education, Division of Vocational and Technical Education, Program Services Branch, September 1966.

Table 6. Enrollments in teacher education[a]

Area and type	Fiscal 1961	Fiscal 1965
Total	38,353	69,051
Pre-service	20,390	33,771
In-service	17,963	35,280
Agriculture		
Pre-service	3,941	3,824
In-service	3,810	6,279
Distributive		
Pre-service	860	1,305
In-service	853	2,249
Home economics		
Pre-service	9,843	14,174
In-service	3,841	6,413
Trade and industrial		
Pre-service	3,424	7,079
In-service	6,843	15,227
Guidance		
Pre-service	2,322	3,304
In-service	2,616	1,652
Technical		
Pre-service	--	479
In-service	--	1,271
Office		
Pre-service	--	3,574
In-service	--	1,463
Health		
Pre-service	--	32
In-service	--	726

[a] U. S. Office of Education, Division of Vocational and Technical Education, Program Services Branch, September 1966.

A bright spot on the horizon in this whole teacher education program is what are commonly referred to as the Perkins Amendments on which hearings have been held. This is House Bill 15444, a bill to amend the Vocational Education Act of 1963. It provides for additional funds for all categories of vocational education.

The part of particular interest for this meeting, and that I would like to speak about, is the provision for fellowships and scholarships for vocational and technical teachers. One part of the bill would authorize $20,000,000 in 1968 increasing to $35,000,000 in 1970 to the Commissioner to make grants to State Boards for Vocational Education for school-industry exchange programs, for in-service training and for operating short-term or academic-year institutes. This proposal would provide the support for students as well as the support for the program. The bill makes provisions for a $100 per week stipend plus dependent allowances.

There is also a provision for fellowships funded at $1,500,000 in 1968, increasing to $5,000,000 in 1970. This provision is designed to provide 100 fellowships for vocational teachers, teacher educators and researchers and 150 fellowships for administrators of vocational education. For an academic year, the stipends which have been suggested range from $3,000 a year for the first year up to $3,800 for the third year with a dependency allowance and an allowance to the institution that will be providing the training. This is the kind of legislation that we need to assist us in providing adequately trained personnel in vocational education.

Summary

I have attempted to provide information about present practices, certification standards, changes in the vocational program that will dictate changes in teacher education, something about our educational institutions, costs to students, support programs, legislation and some innovations. In summarizing, I would say that teachers for vocational education will continue to be provided through a number of routes, through graduation from baccalaureate degree programs in education and through graduation from programs other than education, such as professional nursing and engineering. We'll continue to recruit technically competent people who are qualified as a result of experience in business and industry and technically competent persons leaving the military.

In closing, there are several ideas I would mention as problems or challenges. First, competing salaries will continue to be a problem. It will continue to be a problem as long as we have a tight labor market and until our salaries in education can come more in line with salaries in business and industry. We must make the pursuit of a degree feasible for those persons whom we recruit from business and industry. We need to explore various means for providing the skill and technical competency of teachers. Cooperative programs with business and industry are one way which needs to be further exploited.

As we strive to fulfill our role of preparing adequate numbers of well qualified teachers for vocational education programs, we must strive for changes in what have been traditional approaches, while at the same time using past experience as a basis on which to make sound judgments.

SOME ASPECTS OF TEACHER SUPPLY AND DEMAND

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Everyone has heard about the teacher shortage, and everyone in education has felt its effects. A recent article about the college teacher shortage describes the year in which no research articles were published in journals, and no new textbooks were written (Larsen, 1966). The reason for this decline in publications was that everyone was either moving to a new job, exploring a vacant position, or trying to hire someone to fill a vacancy. It was estimated that 10 percent of all college professors were in airplanes at any one time, and another 10 percent were either driving to the airport, or waiting in an airport to meet a prospect. This ultimate day in the college teacher shortage, when higher education stands still, was projected to occur five years hence.

My own view of the future is less colorful, but somewhat more optimistic. In fact, the supply of teachers seems likely to improve greatly in the next five years at the elementary and secondary level, and about 1970 it should begin to improve at the higher education level. There are some qualifications on this prediction of a better future ahead for the recruiters, but in general, big improvements are in sight.

In the remainder of this paper I would like to do three things. First, review the supply and demand picture for elementary, secondary, junior college, and senior college faculty members. Second, discuss the question of teacher quality, and third, turn to the principal interest of this conference group and indicate some of the problems in studying supply and demand of occupational education teachers.

The statistics about the teacher shortage provided by the U. S. Office of Education and the National Education Association have given an incomplete picture of what has been going on in the past decade, and this has led to more cries of alarm than the actual situation justifies.[1] In spite of all the headlines about the shortages of teachers which regularly have appeared just before school starts, the qualifications of teachers have steadily improved, and the average size of classes has declined slightly, too. Between 1954 and 1964 the NEA has estimated that the number of elementary teachers lacking a bachelor's degree declined from 35 to 15 percent. Census statistics for the 1950 to 1960 period show a somewhat smaller, but still substantial, improvement in the educational qualifications of teachers. During the late 1950's and early 1960's this improvement in the formal qualifications of teachers was occurring at a time when there was a very heavy demand for new teachers because enrollments were expanding very rapidly. Nearly one-third of all college graduates were entering elementary or secondary teaching, and this was still not a large enough supply of teachers to fill all the vacancies. The remainder of the teaching jobs -- 20 to 30 percent of them in most years -- were being filled with experienced teachers reentering teaching. These reentries were almost entirely married women with families who came back to teaching when their own children reached school age. NEA estimates indicate that the average reentering teacher was out of teaching for nine years, which is about the length of time required to have two children and have the youngest reach school age.

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[1] National Education Association (1965) and similar reports that have been issued each year since 1950; and U. S. Office of Education (1965, Tables 22 and 23). The U. S. Office of Education issued similar reports in 1964 and data are available for earlier years.

In Table 1 some projections of both total bachelor's degrees and bachelor's degrees in education are provided. The totals disagree with the Office of Education figures because medical degrees, master's degrees in social work and other first professional degrees which usually follow a bachelor's degree have been excluded from the totals. The enormous increase in the output of the colleges that has occurred and is expected to occur in the future is indicated in these projections. Education degrees have been growing at a somewhat lower rate than the total, and this is expected to continue into the future. Only about 10 percent of the men currently get degrees in education (it is a less popular field than the sciences, engineering, business, or social sciences). This percentage is expected to decline to about 8.5 by 1975. Education is by far the most popular major for women, about 42 percent currently receive degrees in this area, and this percentage is expected to decline to 37 by 1975.

In Table 2 some projections of demand for new teachers are given. Demand is much harder to estimate accurately than supply, largely because we have inadequate information about important components of the situation. The third column indicates that during the next decade approximately 200 thousand new elementary and secondary teachers will be needed each year. Approximately one-fourth of this demand will arise from increases in enrollment and the effects of the recently passed federal elementary and secondary education act. Three-fourths of the demand will be for replacement of persons leaving teaching and for a small amount of replacement of teachers who have substandard credentials.

Table 1. Projections of bachelor's degrees in education and total, 1956-1975[a]

Year	Total degrees (1) Total	(2) Male	(3) Female	Education degrees (4) Total	(5) Male	(6) Female
			(thousands)			
1956	287	178	109	71	20	51
1957	315	200	115	77	23	54
1958	339	219	120	83	26	57
1959	357	230	127	88	26	62
1960	366	230	136	90	26	64
1961	373	230	143	93	26	67
1962	391	236	155	97	26	71
1963	419	247	172	103	26	77
1964	470	272	198	113	27	86
1965	505	290	215	119	28	91
1966	522	295	227	122	28	94
1967	550	314	236	125	29	96
1968	651	361	290	150	33	117
1969	713	398	315	160	35	125
1970	744	418	326	163	36	127
1971	753	422	331	163	36	127
1972	816	464	352	173	39	134
1973	844	476	368	179	40	139
1974	888	499	389	187	42	145
1975	927	518	409	195	44	151

[a] Source: Projections of Commission on Human Resources. Figures exclude first professional degrees that follow a bachelor's degree (i.e. medicine, social work, etc.). Only the number of degrees for the period 1966 through 1975 are projections.

Table 2. Projected demand for new elementary and secondary teachers, 1959-1974[a]

Year	(1) Demand for new college graduates	(2) Demand for experienced returnees	(3) Total demand	(4) Demand for enrollment growth and new programs	(5) Demand for replacement of teachers leaving and substandard teachers
			(thousands)		
1959	116	38	154	49	105
1960	121	40	161	53	108
1961	124	42	166	53	113
1962	124	41	165	46	119
1963	142	48	190	69	121
1964	136	46	182	56	126
1965	154	52	206	71	135
1966	148	49	197	57	140
1967	158	53	211	66	145
1968	152	51	203	54	149
1969	152	51	203	50	153
1970	155	52	207	50	157
1971	154	51	205	45	160
1972	148	50	198	35	163
1973	150	50	200	35	165
1974	152	50	202	35	167

[a] Source: Projections of replacement needs from U. S. office of Education (1965). Enrollment growth projections from Commission on Human Resources. Experienced returnees are projected at 25 percent of total demand. Only the numbers for the period 1966 through 1974 are projections.

Columns (1) and (2) of Table 2 provide an arbitrary division of the demand into demand for new college graduates (estimated to be three-fourths of this total) and demand for returning teachers which is estimated to be one-fourth of the total. I want to return to these ratios a little later, to discuss their meaning in more detail.

The total demand column is a fairly good estimate of how many teachers will be needed to keep on doing what we are doing now in elementary and secondary education. It does not provide for any major new programs or functions to be performed by the schools.

Among the various new educational programs that are being proposed, some would require a great many more teachers. For example, if Project Head Start were to be expanded to a program which involved about half of all three- and four-year old children, and if it boosted enrollment of five-year olds to about three-fourths of the age group, approximately 5 million additional children would be enrolled and 200 to 250 thousand additional teachers would be needed.

If an expansion of preschool education of this magnitude is programmed over a five-year period, demand for teachers would rise about 55 thousand a year for five years, and thereafter would be 15 thousand to 20 thousand a year higher than the total column in Table 2. This illustration is given to indicate that major changes in the demand projection are possible and, with the end of the war in Viet Nam, would probably be likely. A program of the sort I have described above would cost 1.5 to 2.5 billion dollars a year, which is only a small fraction of the added cost of the war at the present time.

In Table 3 the supply of new college graduates is compared with the demand that will be met from new college recruits which is given in column (1) of Table 2. It can be seen that between 1959 and 1963 about a third of all college graduates were employed in elementary or secondary teaching. The output of graduates with degrees in education was inadequate to staff the schools, and since not all education graduates actually enter teaching, between a third and a half of all entering teachers were non-education majors. Most of these college graduates who have entered teaching, regardless of major, have had enough education courses to receive certification.

The important point about Table 3 is the rapid decline in the ratio of demand to supply. By 1970 only 21 percent, and by 1974 only about 17 percent

Table 3. Ratio of new college graduates entering teaching to total number of degrees and total education degrees, 1959-1974[a]

Year	(1) Ratio to total degrees	(2) Ratio to education degrees
1959	.32	1.32
1960	.33	1.34
1961	.33	1.33
1962	.32	1.28
1963	.34	1.38
1964	.29	1.20
1965	.30	1.29
1966	.28	1.21
1967	.29	1.26
1968	.23	1.01
1969	.21	.95
1970	.21	.95
1971	.20	.94
1972	.18	.86
1973	.18	.84
1974	.17	.81

[a] Source: Tables 1 and 2.

of college graduates will be needed to supply the demand for teachers. Even if no experienced returning teachers were available, and all teaching vacancies were filled by new college graduates, the ratio of new teachers to total college graduates would be .28 in 1969, and .24 in 1973, lower than at any point in the past five years. If the expansion of preschool education, described in the example above, were to begin in 1961, and be completed in 1973, and if all these teachers came from the ranks of new college graduates, the ratio of new teachers to college graduates would be .29 in 1969 and .25 in 1973, which is still substantially lower than the average of the last five years.

Table 3 also indicates that in 1969 and after we could probably meet the projected demand for new college graduates in teaching with education majors, if this is considered to be a desirable direction to move in staffing the schools.

There are a number of interesting questions about the effects this relatively greater supply may have in the future. When a school system has a choice between employment of a new college graduate and an experienced teacher who has not worked for a decade, which teacher will be seen as most desirable? If there were a national labor market for teachers, and if the new teacher was usually preferred over the reentry, the result would be a fairly rapid decline in reentries. But there is only a limited national labor market for teachers. The half of the teaching force that are married women compete in a local labor market, and Census migration statistics indicate that while elementary and secondary teachers do good deal, they are likely to remain in the state in which they were born. The existence of a local labor market is an advantage to school systems that pay lower salaries and offer poorer working conditions. Rural and small town schools may continue to depend on returning experienced teachers as their primary source of supply, since they may not be able to attract many of the more mobile new college graduates.

Because the South sends a lower percent of its youth to college than the Midwest or Far West, a larger percent of all college graduates in the South may be needed for teaching positions than in other parts of the country. In addition, the South undoubtedly loses some of its graduates to higher paying systems in other parts of the country and has greater difficulty in attracting college graduates of other regions to its own positions. The result of all these factors may be a continuation of problems in recruiting teachers for a longer period in the South than elsewhere.

The local labor market structure and the importance of noneconomic aspects of teaching jobs for the married woman teacher with a family suggest that the problems of distribution of teachers to slum schools, rural schools,

Table 4. Increases in full-time instructional faculty in degree granting institutions in relation to increases in doctor's degrees, 1955-1975[a]

Period	(1) Faculty for added enrollment growth	(2) Faculty added for replacement	(3) Total faculty	(4) Total doctor's degrees	(5) Ratio of doctor's degrees to faculty
1955-60	25,000	18,000	43,000	44,800	1.04
1960-65	46,000	23,500	69,500	59,300	.85
1965-70	80,000	31,500	111,500	96,700	.87
1970-75	50,000	37,500	87,500	147,000	1.68

[a] Source: Faculty projections made by the Commission on Human Resources include only full-time instructional faculty. Faculty for research, administration, extension, and all junior college faculty are excluded. Replacement needs are based on 3 percent annual rate of faculty loss, one-half the rate used by the Office of Education. The faculty-student ratio is projected at a constant 18 to one, approximately the current ratio. Projections of doctor's degrees by the Commission on Human Resources are higher by about 20,000 than Office of Education projections for the same period.

very rapidly in the postwar period, and they have relatively young faculties with low losses for death or retirement. Faculty salaries and working conditions have also been improving rapidly in the past decade and the available evidence suggests that the net loss from teaching to other occupations like government administration or industrial research has been close to zero. This estimate of no net loss to other occupations from college teaching is the principal difference between the estimates in Table 4 and those of the Office of Education. The Office of Education is still using the magical 6 percent annual loss rate from teaching which the NEA, the Ford Foundation, and the Office of Education have borrowed from each other for years. I have been guilty of using it myself in projections of teacher demand prepared for the Southern Regional Education Board. The important point is that the 6 percent figure has not been backed up by any empirical evidence, and the evidence that does exist from the National Register of Scientists for college science teachers, and from other sample studies, suggests that net loss, except for death or retirement, is close to zero. More important, as Allan Cartter (1965) has pointed out in an article on the teacher shortage, the notion of a larger loss rate is inconsistent with the aggregate statistics which indicate no deterioration of the quality of college faculties, and which suggest a fairly even balance between the supply of college teachers and the demand for them in the 1952-62 period. This could not have occurred if there had actually been an annual loss of 6 percent from college teaching.

Table 4 shows that there was a good balance between the number of persons entering teaching between 1955 and 1960 and the number of doctor's degrees which averaged about 9,000 a year. Actually, only about one-half of the persons who obtain doctorates each year go into college teaching; but since only about one-half of the faculty members of four-year colleges and universities have Ph.D's, the 1955-59 output was at a level which would maintain the status quo. In the period from 1964 through 1969, the rate of growth of the colleges is being accelerated by the rapid increase in the size of the age group, and the increase in size of the cohorts of high school graduates going on to college. This is reflected in a less favorable ratio of doctor's degrees to new faculty needs in both the 1960-64 and the 1965-69 periods.

The output of doctorates has been increasing rapidly (almost 10 percent a year since 1960), but this has not been enough to supply the even more rapid increases of college enrollments. By 1970, however, the situation should ease markedly. The average output of doctor's degrees will be about 30,000 a year during the 1970-75 period, and by 1975 may exceed 35,000 a year.

Even at these higher rates of doctoral output, the percent of the faculty with Ph.D's probably will not rise very much by 1975, although a slowdown in the rate of increase in research funds and research positions may have the effect of markedly increasing the number of doctorates on the faculty.

Colleges and universities do hire personnel in a national market, and an overall increase in supply should benefit the less prestigious universities and the colleges most. The major universities have never had any quantitative problem in recruitment, although like everyone else, they would like to have better quality personnel.

It is also possible that the output of doctor's degrees will not increase as much as the projected figures of Table 4. Certainly, if the federal government gets the idea that there is going to be a surplus of Ph.D's, they can, through their control of graduate fellowship and research assistantship funds, slow down the expansion of graduate education and the output of doctorates. But these are slow processes to change; the average Ph.D program, counting interruptions, is 5 to 7 years long (depending on the field) and funding of new inputs to the system occurs 12 to 18 months before the new students begin study. If we add the planning and budget preparation time, about a ten-year lead time is needed for the effects of decisions about the output of degrees to have a major impact on the degrees awarded figures.

A careful consideration of the figures in Table 4 does not lead to the conclusion that a surplus of doctorates is in prospect, and it would be very unwise if they were interpreted in that fashion. In the next decade there will be a need for a lot more planning of the rate of growth of graduate education and Ph.D output. The present assumption that maximum possible expansion should continue indefinitely will have to be replaced with a more limited rate of growth, and a more careful balancing of emphases among fields and programs.

Table 5 shows some similar estimates of demand for junior college faculties. Junior college faculties are recruited from elementary and secondary schools (about one-third), from students entering teaching directly from graduate school (another one-fourth to one-third), and from a variety of other colleges and other jobs (the remainder). Several surveys of the supply of junior college teachers reported by Brown (1966, Table III-1) show similar patterns of inflow at different times and in different areas. Brown has also estimated an annual replacement rate of 4.3 percent from his survey of new junior college faculty. The figures in Table 5 give estimates of full-time equivalent faculty requirements assuming an annual replacement rate of 5 percent. Total faculty growth will be larger because about one-third of all junior college faculty are part-time, and this will undoubtedly continue in the future.

Table 5. Junior college full-time equivalent faculty requirements[a]

Year	(1) Faculty added for enrollment growth	(2) Faculty for replacement	(3) Total
1960-64	13,000	9,000	22,000
1965-69	17,000	11,000	28,000
1970-74	15,000	13,000	28,000

[a] Source: Rate of enrollment growth for junior colleges from U. S. Office of Education (1965). Replacement needs assume a 5 percent annual replacement rate. Full-time equivalent faculty is estimated from total faculty. A faculty-student ratio of 20-1 is used in the projections.

The number of persons entering junior college teaching from high school each year represents about 0.5 percent of the total number of persons teaching in secondary schools, and the number entering directly from graduate school represents a little less than 3 percent of the master's degrees awarded each year, so the absolute number of persons in relation to the potential supply is not a major issue. The central question is what is happening to the quality of teachers, and whether the supplies in specialized areas, like foreign language instruction, electronics, etc., are adequate. The study of the quality of persons entering junior college teaching in relation to those who continue as teachers at this level, and those who drop out of teaching at this level, is an important area where further research is needed.

Some Estimates of Quality of Elementary and Secondary Teachers

I have already indicated that one of the questions that is emphasized by the greater potential supplies of elementary and secondary teachers is the quality of teachers and the effectiveness of the selection processes by which they are chosen and retained.

The evidence that is available to assess the quality of teachers is not very satisfactory. We have information on their formal educational tions, which, as indicated earlier, have been rising. More than half of secondary teachers in 1960 had five or more years of college; the comparable figure for elementary teachers was about one-fourth. These census figures include substitute and temporary teachers as well as the regular full-time teachers. We can also get information on the percent of teachers who are not certified, but the certification requirements vary greatly from state to state, as do the criteria for meeting the requirements. National figures on the percent not certified do not have any clear-cut meaning.

We also have some evidence from two larger national sample studies about the undergraduate grades of persons who entered teaching after their college degree. Grades are not a very satisfactory measure of teacher quality, because they are primarily a measure of the student's academic success, which may have been in areas that are only partly related to the current teaching assignment. However, if there are big differences in the college grades of persons entering teaching and persons entering other occupations, this will have some significance for the job of the schools.

Table 6 summarizes the results of a five-year follow-up of persons who graduated from college in 1958. Those graduates who were teaching in 1963 are compared with all graduates. The differences are very small. Men who go into teaching made average grades, women made slightly above average grades, but the differences are not important. The only suggestion for selection that is provided by the data in Table 6 is that fewer men and more women ought to be selected. This is not very practical in view of the need to staff fields in the occupational, vocational, physical education and other areas with men.

One possible explanation for the data in Table 6 is that persons majoring in education took easier courses, and their grades are not an accurate reflection of the "true" ability of people entering elementary and secondary teaching. To examine this question, data from another large national sample survey conducted by the National Opinion Research Center were utilized (Table 7). These data come from a three-year follow-up of college graduates of 1961 and persons with an education major can be compared with persons who are teachers with some other major (mostly arts and sciences). The adjusted grade point averages in the two studies are expressed in approximately the same numerical scale. The differences between education majors and other majors are small, and no real importance can be attached to them.

Table 6. College grades of persons teaching in elementary and secondary schools by sex[a]

Group	Adjusted grade point average
Male elementary teachers	2.8
Male secondary teachers	2.8
Total male college graduates	2.8
Female elementary teachers	3.1
Female secondary teachers	3.2
Total female college graduates	3.0

[a] Source: Special tabulations from Bureau of Social Science Research five-year follow-up of college graduates of 1958. Figures include all persons teaching in 1963. Grade point average is adjusted for estimated differences in ability of students attending different colleges.

Table 7. Academic performance index of teachers by field of study, sex, and level of teaching[a]

Major field and sex	Elementary	Secondary
Male education major	1.32	1.48
Male other major	1.53	1.49
Female education major	1.74	1.82
Female other major	1.69	1.89

[a] Source: Special tabulations from National Opinion Research Center follow-up of 1961 college graduates. The academic performance index is an adjusted grade point average.

We were also interested in whether the shifts in and out of teaching during the period of these surveys tended to raise or lower the grade average of teachers. In other words, were the persons who made high grades in college moving out of teaching, while those with low grades stayed in? The period covered by the follow-ups is a short one, but in the Bureau of Social Science Research survey there was a net loss of about 10 percent among the men, and about one-third among the women. These losses did not have any appreciable effect on the grade level of persons in teaching, however. It appears that persons of about the same level of ability were leaving teaching as those who remained.

These rather unsatisfactory overall measures of teaching ability need to be supplemented with more comprehensive studies that get at the dimensions of quality for representative samples of persons who enter various teaching posts, who move in and out of teaching, and who move between different kinds of school systems.

Teachers of Occupational Education

To what extent can the analyses of the teacher supply and demand picture be applied to the field of occupational education? It may be that the demand for occupational education teachers will be much greater than the supply, even in a situation where the overall supplies are quite adequate.

Recent large increases in federal funds for occupational education have greatly increased the demand for teachers, at a time when the supplies of qualified teachers coming from collegiate programs are inadequate to meet the demand. A variety of adjustments are occurring, but we have no quantitative evidence about their magnitude. Industrial arts teachers in junior high schools may be drawn into senior high and vocational teaching positions. Graduates with a specialty in one field may be drawn into another field. Part-time teachers from business and industry will be used more extensively, and some full-time teachers will be recruited from business and industry. No good measures of the magnitude of these flows and adjustments to the higher level of demand for occupational education teachers exist. At the present time, about all we can do is indicate the kinds of statistics that should be collected.

The problem of definition of occupational education is a central one, which must be resolved if any useful studies of teacher supply and demand are made. Occupational education is a general term to cover a variety of programs, but it has very vague boundaries. In one sense, nearly all educational programs at the secondary and higher education level are "occupational." Students enrolled in these programs have predominantly vocational and occupational goals, and make their program choices with occupational objectives in mind. Many courses, even the so-called "basic" courses are designed to equip the student with "practical" and "useful" skills and knowledge.

Examination of the statistics that have been collected reveals the confusion that exists. In 1962-63 the Office of Education made a survey of "Industrial Arts Education" which examined programs, teachers, students, and curriculum. This survey, which appears to have been well done, indicated that there were about 40,000 teachers of industrial arts, 18,000 in senior high schools, and another 9,000 in mixed junior-senior high schools. Thus it appears that in senior high schools there are at least 20,000 teachers and approximately 2,000,000 course enrollments. In another series of statistics, the Office of Education presents statistics on federally aided vocation and technical education. They report about 10,500 technical and trades teachers in the same year and about a million course enrollments. There is not supposed to be any overlap in these two sets of figures, but there is no comprehensive overall series that relates industrial arts education, vocational education, and other occupational teachers who do not fit into either of these two categories.

The survey of industrial arts education has some but not all the information what would be desirable in studying teacher supply and demand. There is no information on either age or sex of respondents. Age is a critical variable in determining expected future career length. While it is possible to make some inferences from the information on number of years of teaching experience, many of these teachers have had work experience; information about origins and length of teaching career is needed. The vocational education statistics are even more deficient in the kinds of information needed to study supply and demand for teachers.

The Office of Education has also provided statistics on the enrollment of students in colleges in "organized occupational curricula." The definition of these programs is not entirely clear-cut but, in general, they are programs which are formally organized and do not lead to a baccalaureate degree. If a bachelor's degree is given, even for a program called hotel and restaurant management, baking science, secretarial science, or packaging, it is excluded from the statistics.

Enrollments in these programs have been about 6.5 to 7 percent of total degree credit enrollment in the last eight years, but they are a much larger proportion of junior college enrollment where most of the programs are concentrated. They have been a declining proportion of junior college degree credit enrollments (55 percent in 1957 - 47 percent in 1965). About 400,000 students were enrolled in these programs in 1965, with about 40 percent of them on a part-time basis. No useful data about the teachers in these programs have been collected and reported by the Office of Education. Age, and other less attractive positions, will continue for a long time, even though the overall supply is much more adequate. Additional research on the structure of elementary and secondary labor markets should be helpful in planning ways to deal with local teacher shortages.

The greater potential supply of teachers also suggests that questions of teacher quality, and the selection of the best teachers from among a number of candidates will become more important. As long as everyone who met the minimum certification requirements could obtain a job, there was not much pressure to emphasize the problems of teacher quality or criteria for teacher selection. Since the protective function of every profession also opposes external estimates of quality, the evidence available about the quality of teachers is very unsatisfactory. I want to return to this problem a little later, and after presenting some of the information that is available on teacher quality, I think you will agree that this is an area where much more research is needed. It is also an area where the resistance to research is likely to be higher than average.

Teacher Supply and Demand in Colleges and Junior Colleges

The college teacher supply picture is also going to improve, but somewhat later than the elementary and secondary supply (Cartter, 1965). The discussion of college teacher supply has to be divided into a junior college portion and a senior college portion, because the patterns of recruitment and the requirements for teachers vary so much at the two levels.

The supply and demand situation for college faculty is summarized in Table 4. Unlike elementary and secondary teachers, the major component of demand for college teachers in the last decade and in the next decade will be new teachers needed for enrollment.growth. Colleges have been growing sex, preparation, teaching experience and salary data are needed to produce reasonable estimates of the supply and demand picture.

Even less adequate information is available on the post-secondary noncollegiate programs. These include nursing (where good statistics are available), secretarial and business schools (where data are very poor) and technical and trade, where it is hard to assess the coverage and quality of data that are reported. Adequate statistics on teachers are not provided on any of these programs except nursing, and even then some of the information that is needed for supply and demand studies is lacking.

A broad definition of the fields of occupational education will be valuable in studies of teacher supply and demand in order to identify the flow of teachers between the different areas of occupational education. For each area included in the definition of occupational education, information should be collected periodically from a sample of schools which would indicate: (a) amount of turnover, (b) origins of new teachers, (c) years of teaching experience, (d) age, (e) educational background, (f) sex, (g) current salary, (h) specific field of teaching, (i) full- or part-time status, (j) amount of enrollment growth in the sample system, and (k) number of "new" teaching positions created. Career intentions, characteristics of an ideal job, etc., could also be obtained, but the items enumerated above constitute basic information required to make an analysis of teacher supply, turnover rates, and an indication of the sources of demand for teachers. Until such studies are made, our information about the characteristics of teachers in the rapidly growing and important field of occupational education will remain fragmentary and incomplete. Adequate planning of programs to alleviate occupational teacher shortage problems must wait until better information is available.

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STAFFING JUNIOR COLLEGES

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We have just completed a study of junior college staffing practices. One respondent to our questionnaire was Bill Moore, a recent graduate with a Master's degree in Business Education from the University of Texas. Early in the spring semester before his graduation, he sent "cold turkey" letters inquiring into possible positions and outlining his qualifications, to all of the larger, better known schools in the southeastern region. Some did not reply; none offered him a post. He told his faculty advisor of his desire for a teaching position, and also informed friends teaching in the area of his availability. Bill also registered with the University placement service. None of these formal or informal channels turned up more than lukewarm leads.

As the April deadline for recruiting faculty neared, Bill considered registering with a commercial teacher placement agency. However, one of his teachers from undergraduate days with whom he had kept in touch wrote Bill concerning an offer he had just refused at a small public junior college in northern Florida. Bill's teacher told the school of Bill's possible availability and suggested that Bill investigate the opening. A prompt call to the Dean revealed mutual interest. Following an interviewing trip to the campus, Bill Moore found his post, and the school had filled an 18-month old vacancy.

Is Bill Moore's experience typical of the hiring procedures for junior college faculty members? What channels are used to search for jobs? How are the best jobs found? How do the most successful recruiters proceed? Which criteria are most important in choosing among job alternatives? How smoothly does the teachers' market operate? Do candidates and employers locate their best alternatives? What, if anything, might be done to improve the market?

Only by first understanding Bill Moore's experience, and the experience of other Bill Moores, can we appreciate the unique characteristics of the market for occupational education instructors and, in turn, formulate intelligent manpower policies, maximize the utilization of one of our nation's scarcest resources (i.e., good instructors of vocational topics), and minimize the mismatching of candidates and employers.

The essence of the "market" for any commodity, be it cars, potatoes, or faculty services, is the exchange of information between potential sellers and prospective buyers. As economic theory points out, the benefits accruing to society from competition in the marketplace are limited by the degree to which information flows freely in a given market situation.

Markets for labor services have to deal with a great number of constraints to knowledge. For example, suppliers are not homogeneous; unlike industrial manufactures or agricultural produce, human resources and skills are almost impossible to grade and classify into discrete, descriptive categories. Also, each supplier must consider more than the price he is offered for his specialized service; for example, he must evaluate the subjective elements of the work environment. In other words, job choice is an important element of labor market decisions for suppliers, a factor which is not even introduced into the market for passive product inputs such as raw materials.

Labor market analysis, therefore, studies the social institutions that constitute the market mechanism; that is, how is information exchanged between the bargaining parties and what is the essential information that must be exchanged.

Specifically, this afternoon we would like to answer three questions: (1) How does? (2) How well? and (3) How better? How does the market for teachers of vocational education operate? How well does it function? How could it be made to function better?

First, how does the market operate? The answer for professors in four-year colleges and universities is easy, for a number of market studies have been made: of prestigious universities by Caplow and McGee, of economists by Ananataraman, of psychologists by Klugh, of English-history-economics by Marshall, of Minnesota professors by Stecklein-Lathrop-Eckert, of teachers' colleges by Ellsworth, of a broad spectrum of college professors by Brown, et cetera. These studies conclude that: (1) Professors switch freely among geographic regions, types of colleges (e.g., public versus private and large versus small), teaching environments, and academic rank; but they are very loyal to their discipline, rarely accepting appointments outside their specialty. (2) The professorial attitude toward job search follows that of a "reluctant maiden" toward husband search: except among emerging graduate students the open declaration of "availability" is taboo. The grapevine is far more popular and respectable than employment agencies. The best recruits are never "on the market," but wait to be sought out by an eager recruiter. (3) College professors choose among jobs according to what they will be asked to do, not where they will do it and not how much they will be paid. After certain minima on salary and location have been fulfilled, the courses to be taught, teaching load, research facilities, and competence of administrators are the decisive factors.

This gold mine of information on four-year college professors at best only suggests the behavior of instructors of occupational education, for typically such instructors are not located in four-year colleges and universities. Indeed, 84 percent of the college students enrolled in occupational programs are in junior colleges. Our just completed survey of 1,400 newly hired junior college instructors is more directly relevant to occupational education, for there are nearly 300,000 occupational teachers in junior colleges compared to only 50,000 in four-year institutions. Although the average junior college teacher of our survey is probably not identical to the average instructor of occupational education, and we would therefore urge you to keep in mind what modifications in our general results would be appropriate for this specialized group of instructors; due to the lack of a study specifically relating to occupational education, the best we can do in fulfilling our assignment to "summarize the studies (if any) in occupational education" is to describe The Instructor Exchange, the market for junior college teachers.

Thus, how does The Instructor Exchange operate?

First, what are the channels of communication? There is definitely no Wall Street, no big board, no central meeting place where buyers and sellers comingle to interchange information. Instead, a supplier like Bill Moore has a wide variety of job-search channels from which to choose.

Following the customary practice of secondary school teachers, over half of the job hunters write blind letters asking potential employers about a vacancy and informing them of their availability. A majority of the candidates who use this method find their best job as a result of it. Letter writing is an inexpensive and expedient means of contacting a large number of prospective employers. It is accepted by administrators and is successful for candidates.

Both college placement offices and commerical teachers' agencies are popular institutions, a pattern of market behavior that closely parallels the secondary school teachers rather than professors in four-year colleges and universities whose academic ethic dictates less conspicuous search methods. Unlike the four-year market, junior college jobs found through these intermediaries are not inferior to jobs found informally (as judged by hours of teaching load and salaries) and formal methods are often the initial search channel instead of being held in reserve in case informal methods fail. The acceptability of formal methods is likely to be cumulative. As more teachers consult formal intermediaries, more employers list, and vice versa. More jobs and more candidates means more success which, in turn, stimulates registration and use.

However, even in the junior college market, it is often "who you know that counts." Informal contacts are extremely important in job search. The first lead to better than one-fifth of all new appointments came from graduate school classmates, faculty colleagues, and other professional friends. Graduate school faculty, who are the primary informal contacts in the four-year market, are not as knowledgeable about jobs in two-year colleges. Consequently, aspirants to junior college positions must rely more heavily upon job brokers and other less personal sources of leads. Fortunately, because of their familiarity with the practices followed in secondary education, junior college teachers view the more formal channels as viable and respectable.

The breadth of the job search pattern depends on the urgency with which a candidate enters the market. Junior college job seekers will expend effort, time, and money in job search only inasmuch as the costs of finding a new job do not exceed the benefits they expect to receive from their new job. If the additional benefit to the received exceeds the additional effort in search, the search will be continued. If not, the search will be stopped, and the best job alternative will be accepted.

In bringing together the job search process and marginal analysis, we would expect that those persons who had a great deal to gain from search, and those for whom search would be least expensive, would employ the most time and effort in job pursuit. The job-search patterns of our respondents support this marginal analysis hypothesis. Emerging students spend more time than experienced instructors. Of those leaving a faculty position, the actively dissatisfied spend more time than the satisfied, and those who have been fired search longest.

A second way to describe the market for junior college teachers is to answer the question, "Where do new instructors come from?" In the face of rapidly expanding enrollments, competition for both novice and experienced faculty is keen; an administrator responsible for hiring cannot always depend on the "right" blind letter to cross his desk or his friend at the State University to call and recommend a promising student. Because of the emphasis junior colleges place upon teaching ability and experience, upon courses in educational methodology, upon subject matter breadth, upon sympathy toward the two-year college concept, and upon experience with partially immature students of mediocre ability and because of the lack of resources to compete for Ph.D.'s--junior college recruitment efforts are directed toward staff at secondary schools and graduate students without the doctorate.

Pinpointing faculty prospects who are willing to move is a difficult process, one that is both time-consuming and expensive. The true boundaries of the market's pool of available candidates are concealed by the sideline spectators and other faculty "fakers" who are not earnestly seeking positions. The "fakers" are the perennial "job watchers," the instructors who are constantly in the market but never available for a job, who want to learn more about possible opportunities, who wish to drive a better bargain with their current employer, or who just seek to bolster their own egos with the knowledge of their worth. At the other extreme are the "reluctant maidens," potentially persuadable, but not on the market. As open commitment to the market is far less common than edging into it, recruiters must actively pursue promising candidates. In our sample of new faculty in 1964-65, for example, 18 percent of all job changers state that they did absolutely nothing to look for a new job.

The successful recruiter must look past the fakers and ferret out the reluctant maidens. Other junior colleges are not a rich source of faculty for would-be pirates; when instructors leave junior colleges, they tend to leave higher education entirely. Of every 100 new teachers we surveyed, only six had moved between jobs at the two-year college level.

Prime recruits are the young and unattached teachers who have no good job to return to; for these are the persons to whom movement offers the most and costs the least. The typical job switcher is eight years younger than his colleagues, does not own his home, and is likely childless.

Willingness to move is also conditioned by the need for security. Instructors in disciplines such as English and vocational courses, especially business, which are characterized by the most vacancies are more confident of finding a job. Since salaries in their disciplines are being bid up by competition among employers, the only way in which they can benefit from the market action is to enter it--either by accepting an offer or by stimulating their current school to match the market price in order to retain their loyalty.

One pool of sincere job searchers in the market is the contingent of involuntary movers, both those professors who have been fired and emerging graduate students, for these groups have no current job to fall back upon. Another serious source is the disenchanted, those faculty members who consider their jobs unacceptable and consequently have a strong desire to move.

Finding the pool of potential movers is only the first step for the administrative hirer; he must know what and how to bid when he enters the market. His concern is with supply to his college, not the market as a whole. He needs to know how he can get a man to accept his offer, not how to move a man. The procedures and criteria candidates use in deciding what jobs to accept and reject are varied and almost subconscious. Yet, as with all theory, much can be learned from an explanation that is substantially consistent with reality--even if not universally applicable.

Thus, a third descriptive question, "How do candidates choose among job offers?" Instructors structure ready objective criteria for eliminating the least attractive offers: for example, a minimum salary, a specific location, specific courses they do or do not want. These criteria allow them to see past the unwanted jobs and focus upon only the most attractive alternatives.

What makes a job totally unacceptable? This question was answered by the group who identified their previous position as unbearable. The most frequent replies were too low salaries, incompetent administrators, poor prospects for advancement, insufficient cultural attractions, and too heavy teaching load.

To learn what factors influence a candidate in favor of a given job, we asked new junior college teachers to compare their two best job alternatives on 17 factors and then to indicate the importance of each factor in their choice process. Professional and economic factors dominate. In the final decision, instructors stress what they will be doing on their new job. Roughly half of the decision rests upon the type of teaching (courses taught) and its amount (teaching load). One-fourth depends upon present and future salary.

Financial need is not an absolute standard, but is rather a concept relative to the spending patterns of one's peer group. Thus, junior college instructors with secondary school experience are less salary conscious than professors more conversant with the higher salary practices in four-year colleges and universities. This point is particularly vivid when salary concern is contrasted by region. By far the greatest concern for compensation is in the North Atlantic region. Yet these salaries are above the national average for all junior colleges. Why should instructors with already higher than average salaries be the most concerned? The explanation lies in the fact that competition from high income neighbors is also greatest here. Per capita income is highest in the North Atlantic. Relative to other incomes in the region, junior college instructors in the North Atlantic are the poorest paid in the nation. The highest relative incomes are in the Southeast and West, and it is here also that there is the least recognition of compensation in the job choice decision.

How well does the market operate?

A recruiter enters the market with an attractive "package" to offer the candidate who meets exacting standards. A qualified prospect whose well-defined needs this package meets plunges into the market. To what extent do the job-search channels of sellers and buyers intersect? How well does the market's information system function to bring the best-matched demander and supplier together?

The Instructor Exchange lacks the efficiency of the modern stock exchange. It is inconceivable that a share of A.T. & T. would have more than one price, but the unwillingness of junior college professors to cross state and regional boundaries contributes to substantial salary discrepancies. Where bargainers are not aware of terms concluded by similar parties, dissatisfaction results later when contracts are compared. Participants on the floor of the Stock Exchange recognize that different issues command different prices reflecting discrepancies in product demand. However, the relatively scarcer disciplinary specialists, such as mathematicians and business education teachers, are not rewarded in salary and teaching load proportionately more in response to their shortage. As a rule, junior college administrators have not taken advantage of their opportunity to differentiate salaries according to scarcity. The Instructor Exchange, which allows immobility in the presence of salary differentials and permits ignorance where informed judgment is essential, generates dissatisfaction among many of its users.

A single recruiter (or candidate) entering the Instructor market may, if he is knowledgeable, turn the immobilities and imperfection of the market to his advantage. The individual administrator can "beat the market" in three ways: (1) attract more people by offering more attractive terms, (2) find and attract more people by better recruitment, and (3) decrease staff requirements by limiting enrollments or altering the structure of his demand.

The most obvious solution is to raise salaries selectively--among beginning professors in the most scarce disciplines. Non-monetary means available include flexibility in course selection, and choice of few large, or more small, classes taught. Offers of higher rank, moving expenses, and expenses for professional meetings may also be used.

Recruiting effectiveness can be extended by trips to graduate campuses, by supporting department chairmen in convention placement activity, by mailing notices of a vacancy to all college placement offices and to commercial teachers' agencies, by following up letters from inquiring prospects, and by examining the rosters of neighboring secondary schools for qualified candidates.

If neither recruitment nor terms can be improved, the only remaining solution is to reduce and change faculty needs. Course offerings in shortage areas can be curtailed or student loads increased; less qualified candidates can be considered; enrollments can be limited.

Like employers, candidates may also increase the number of options available to them. They can locate more prospects by registering with the many available brokers, such as college placement offices, commercial teachers' bureau, state departments of education, denominational placement offices, and professional association rosters. They can talk to informed friends and write blind letters to desirable employers. Personal contacts are the candidates' best "in." Convention attendance or a mutual friend's recommendation increase a candidates's chances of being offered a job.

How can the Instructor Exchange be improved? In spite of informed individuals who can "beat the market," without a free flow of information and manpower both candidates and jobs are mismatched. In an imperfect market too many false moves and too few right ones occur, and job shopping by trial and error is costly for both teacher and employer.

The haphazard decentralized methods of disseminating information about jobs and candidates described above needs innovation. It would be desirable to develop a roster of all teaching-qualified persons in the United States, with some indication of each person's current inclination to consider job changes, and to allow employers access to this list through a computer at a minimal cost. The technology is currently available; only the financing is in question.

Complementing the supply roster should be a similar listing of vacancies. Employers should list all vacancies as honestly and specifically as possible, then this listing would be made available to candidates in the same manner as the supply list to demanders. Since junior college and four-year college teaching jobs require such different skills and draw upon such different groups of people, it would be desirable to list junior college vacancies separately from the others.

With these innovations, and with greater awareness of the mechanics of the Instructor Exchange conveyed by studies such as the one we have just completed, the Exchange should be able to service the community in a more effective way than it does at present.

EDUCATIONAL PLANNING

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This conference is, in its format, participants, and subject matter, one more example of what Professor Mary Jean Bowman (1962) of the University of Chicago called, in a recent article, the "Converging Concerns of Economists and Educators." Economists are increasingly recognizing that such a large and important segment of the economy as the "knowledge industry"[1] cannot remain exempt from economic analysis. Educators are more and more willing to recognize that schools and universities must come to terms with the larger economy from which resources are obtained, and in which the output of the nation's educational institutions must compete for a livelihood.

Differences between points of view will, of course, remain. Educators are bound, by their total responsibility, to consider psychological and sociological, as well as economic, factors in planning and operating educational programs. Furthermore, educators must make day-to-day decisions, on the basis of the multitude of pressures to which they are subjected. For example, in spite of the present "shortage" of teachers, they must fill the classrooms. They recognize, as economists point out, that these shortages are for well-qualified personnel, at present salary levels--that there is no shortage of properly qualified teachers, and that if salaries were doubled, the so-called shortage would disappear.

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[1] For an economic analysis of the knowledge industry, see Machlup (1962).

These and other conceptual difficulties underlie any consideration of educational planning. Economic analysis is not exempt from them. However, economic planning models are, on the whole, formulated in such a way that the underlying assumptions can be made explicit. Hence, the results of the planning process can be evaluated in terms of these assumptions, and the nature of the data which are available.

It should be pointed out that your speaker is not an economist, but an educator with some background economics and a deep interest in the contributions of economics to educational administration. This is both a virtue and a fault. I hope that our common backgrounds will make it easier for me to interpret these planning models for the educators who are present at this conference. However, in any translation there is a loss -- I trust that the benefits of this procedure will outweigh the costs.

Education as the Development of Human Resources

Underlying the economist's professional interest in education is a renewed awareness of the importance of human resources to a nation's economy.[2] Education may be thought of as the development of human capital, which is analogous in important respects to physical capital, and is of at least equal importance in the promotion of economic growth as are machines and factories.

We can understand the economist's approach to educational planning better if we pursue this analogy a little further. Human capital is similar to physical capital, in that both have a relatively long production period. A major reason, for example, that planning is necessary in the production of physicians is that as much as seven years of specialized training may be required, so that we must make decisions today which will determine our supply of medical personnel in the mid-1970's.

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[2] For a brief description of the place of education in economic history, see Vaisey (1962, Chapter 1).

Once developed, human and physical capital are similar in their durability. Human capital is at least as durable as many kinds of physical capital. However, both human and physical capital may become obsolete. When this happens, factories may have to be remodelled, equipment may need to be discarded, and people may need extensive retraining. In fact, as attendants at this conference will know, obsolescence is a genuine problem in occupational education, and underlies the controversy over the merits of general vs. specific job training.

As scientists, economists give extensive attention to measuring the concepts with which they deal. They are concerned with the costs and the benefits of social policy, including the development of a society's human resources. They have used three main types of analysis in studying the economic aspects of education, namely: (1) the simple correlation approach; (2) the residual approach; and (3) the returns to education approach (Bowen, 1964).

The Simple Correlation Approach

It is by now well known that the educational system of a nation is closely related to its economy. There is a high statistical correlation among the nations of the world between expenditures per student for education (or school enrollments as a percent of total population) and gross national product (see Harbison and Myers, 1964; Edding, 1958). A similar relationship holds true among the states of the United States, and this relationship has persisted over time (Loveless, 1960).

This statistical relationship is not necessarily, of course, a causal one. It may mean that education causes economic prosperity. It may, on the other hand, mean that education is a valued consumer good, and that countries therefore spend more for education as their gross national product increases.

The Residual Approach

Economists have given considerable attention to statistical explanations of economic growth. Their procedure is to measure the increase in economic output over a given period of time, and to identify as much as possible of the input which produces this output. Their calculations indicate that a sizeable proportion of the output increase cannot be explained in terms of increases in inputs (capital and labor). The unexplained portion of output is termed the residual. Since it appears likely that education is one factor contributing to the increased productivity of labor and to improvements in physical capital, these results are taken to indicate that improvements in education have contributed to economic growth.

The Rate of Returns Approach

Rate of returns analysis is central to any method of educational planning. Mary Jean Bowman (1962, p. 111) presents the issues clearly in the following statement:

> Allocative analysis is basic to both private and public decision making. On the normative or policy side it asks such questions as these. How large a share of available resources should go into roads as against schools? Into secondary versus elementary schooling? Into technical schools versus on-the-job training? Into college versus adult education? Back of the normative analysis lies the theoretical framework as a positive discipline dealing with economic phenomena: What returns relative to costs may be expected from various alternative actions, and why have the present allocations of resources come to be what they are?

> The most embracing and refined theoretical construct applicable to economic analysis of investment in education is represented by the rate-of-returns approach. Though its rigorous application is normally frustrated by inadequate data, the basic propositions and techniques are pervasive and indispensable for any rational analysis. When the returns relative to costs that would be realized from added investment in one direction exceed those anticipated from investment in another, most people would concur that the former is economically preferable.

Although the theory on which rate-of-returns analysis is based is sound, the applications of the theory have been limited by shortages of data. Most applications have been made in the United States, and most are based on census data. Application of smaller units than the entire country is hindered by problems of population mobility. Results such as those of W. Lee Hansen (Table 1) illustrate the approach and the magnitude of the resulting rates.

In order that this procedure may be of value to educational planners, it is desirable that these calculations be extended to include categories of occupation, students of varying ability, and differing levels of educational quality. Finis Welch's (1966) dissertation addressed itself to the latter problem. Valerian Harvey (1967) has written a dissertation at the University of Chicago which is closely related to the topic of this conference -- he studied rates of return to investment at various levels of teacher preparation. This study will help to clarify the economic aspects of salary schedules.

We now proceed to a discussion of various planning models used by economists. We begin with the manpower planning approach, and then proceed to discuss several types of systems analysis models.

Table 1. Internal rates of return to total resource investment in schooling, United States, males, 1949[a]

	From:		(1)	(2)	(3)	(4)	(5)	(6)	(7)
To:	Age		6	8	12	14	16	18	20
		Grade	1	3	7	9	11	13	15
(1)	7	2	8.9	....	....	....	....	....	....
(2)	11	6	12.0	14.5	....	....	....	....	....
(3)	13	8	15.0	18.5	29.2	....	....	....	....
(4)	15	10	13.7	15.9	16.3	9.5	....	....	....
(5)	17	12	13.6	15.4	15.3	11.4	13.7	....	....
(6)	19	14	11.3	12.1	11.1	8.2	8.2	5.4	....
(7)	21	16	12.1	12.7	12.1	10.5	10.9	10.2	15.6

[a] All rate-of-return figures are subject to some error, since the estimation of one decimal place was made by interpolation between whole percentage figures. Source: Hansen (1963, p. 134).

The Manpower Planning Model

Implicitly or explicitly, allocative decisions in education are made in terms of some estimate of future manpower requirements. When a new school of medicine is built, or when a university establishes a department of graduate study in economics, assumptions are made about the future need of physicians or for economists. Manpower planning is a procedure for making these assumptions explicit, so that present decisions will be congruent with future needs.

Plans for the training of personnel for future needs are being made all over the world -- in the United States, the U.S.S.R., and in many of the underdeveloped nations. These plans differ in the way in which they are developed, in their specificity, and in the degree to which they affect social and private decisions. (For example, in the United States, where educational decision-making is decentralized to school boards and to individual students and their parents, national manpower planning has affected mainly certain marginal aspects of education, such as projects for retraining individuals displaced as a result of technological change.)

Manpower plans may be developed with respect to certain critical aspects of the labor force where bottlenecks have developed. For example, there has been concern, here, and abroad, for the development of adequate numbers of "high level" manpower, such as engineers, mathematicians, and physicists. In some countries, universal literacy is a central goal. In general, plans tend to be more specific and more extensive. The procedure in developing manpower plans may be described as follows (Harbison and Myers, 1964, Chapter 9):

1. A manpower survey or inventory for the present and the immediate future is conducted. This includes the numbers of males and females employed in each sector of the economy (agriculture, mining, manufacturing, government services, etc.).

Within each sector, an estimate is made of total employment and of numbers unemployed. Also, in each sector, employment is classified according to occupational categories. The education usually required for each occupation is listed. This may include the level of education (secondary, higher, graduate), the type of education (technical or general) and the degree of specialization required. It has also been suggested that specific skills and knowledge requirements for each occupation be listed (Eckaus, 1962).

The information may be obtained from a special or general census, or from a survey of employers.

2. An estimate of total output and employment, and output and employment of each sector of the economy is made for the year to which planning is carried out (the target or forecast year).

3. An estimate of the occupational requirements for each sector of the economy at the target year is calculated. This estimate must take into consideration occupational changes associated with increased productivity (see Table 2).

4. An estimate is made of the stock of personnel with each level of educational qualification, at the target year. This estimate is based on the present qualifications of the labor force, flows from the educational system as now constituted, and allowance for withdrawal from the labor force, due to death, retirement, or other reasons.

5. The estimated composition of the labor force on the basis of present plans is compared with the requirements calculated in Step 3.

6. The nature of the required expansion of the educational system, to close the gap between requirements and present output level, is calculated.

Evaluation

There is considerable logic in the above six steps. Furthermore, these procedures (or modifications in them) have been applied in many nations, and a considerable amount of practical experience has been gained. Planning manuals have been developed, and planning "experts" are available.

On the other hand, the manpower planning approach has weaknesses, and these must be recognized if the methods are to be used intelligently.[3]

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[3] For a lucid analysis of the manpower training approach to educational planning, see Anderson and Bowman (1964).

The Nature of Economic Forecasts. The term forecast implies a prediction. Change is so rapid in the modern world that no one, regardless of the analytic tools he possesses, can predict or forecast the future. In this connection, Beckerman wrote:[4]

> People who believe that economists should be capable--provided they are smart enough and provided they equip themselves with the necessary gadgets, such as input-output tables, demand functions, intra-firm comparisons, field surveys, etc. -- really to foretell the future are, to my mind, in the same category as members of ancient tribes who attribute similar powers to their witch doctors.

Projections are different from forecasts. They express the logical consequences of stated assumptions. Targets imply goals or indications of directions to be followed. Most manpower experts seem to be using the idea of a target, rather than that of a forecast or projection.

Economic Assumptions in Manpower Planning. According to Anderson and Bowman (1964), the concept of manpower planning is more a technological one than an economic one. However, it contains implicit economic assumptions which are at best questionable (Anderson and Bowman, 1964, p. 20).

> The use of "technological," which has become common among educational and manpower economists, means simply single-valued quantitative forecasts. It does not in fact escape economic content, however; instead it carries the economic implication of ex ante zero demand elasticity; even if we substitute "highly inelastic" for "zero," this is a very strong assumption that goes well beyond zero elasticity ex post or after arrival at any given point in time. All changes over time in the numbers of men employed at any given skill or occupation are thereby implicitly interpreted as shifts of demands, and changes in pay rates are irrelevant.

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[4] W. Beckerman, Long-Term Projections of National Income, mimeographed paper for the Training Course for Human Resource Strategists, OECD, Paris. Quoted in Harbison and Myers (1964, p. 201).

Furthermore, the manpower planning model seems to assume zero cross elasticity of demand. That is, it seems to assume that there is little possibility of substitution of one kind of human input for another, or of capital for human inputs. Bowles (1965) presents evidence which questions this assumption.

Fixed Educational Production Functions. The manpower planning model, as translated into educational requirements, seems to rule out changes in input combinations within educational systems. Teacher-student ratios are taken as given, and no attention is given to the possibility that educational productivity may be increased over time through, for example, the use of technological innovations (such as televised c computerized instruction).

The Locus of Manpower Training. The manpower training model seems to imply that all such training takes place in schools and colleges. It does not adequately treat the very important role of on-the-job training.

Lead Time in Planning Models. Most manpower models seem to imply that a relatively long planning period is needed to provide the necessary facilities and personnel and to carry out the training that is required. This assumption is valid in the case, for example, of medicine. It may be much less valid in most other professional and subprofessional occupations.

They also tend to assume that important decisions must be made at irregular intervals, rather than small, incremental decisions on an annual basis. To the extent that this is true, and that a planning decision might consist, for example, on whether or not to build a new university, the planning time will be lengthened.

Skill Obsolescence. Manpower planning models are not suited for conditions involving rapid obsolescence of skills. In these cases, where the skills of present manpower will become obsolescent before the end of the planning period, long-term planning which is characterized by a considerable degree of job specificity seems inappropriate. Planning might be better directed to decisions as to numbers of individuals to be educated at various levels, with an emphasis on general and transferable vocational education, rather than on specific occupational categories.

Costs and Benefits. Finally, manpower planning has not explicitly considered the costs of the training program. Hence, it is not possible to determine whether a particular training program is justified, in terms of the benefits it brings and the costs which are involved. For example, a state of the United States may decide, if it considers both costs and benefits, that a program of graduate education in architecture is not economically feasible, and that the state university should not expand in this direction.

Manpower Planning in the United States

In spite of the emphasis, in this country, on decentralized decision-making in education, the United States Department of Labor has developed relatively sophisticated manpower planning procedures.

Manpower projections indicate a labor force in 1975 which is more highly educated than the present labor force. It is anticipated that it will contain more professional and technical workers, and a smaller proportion of laborers and farm workers (Table 2). This demands increased attention to provide facilities for higher education, especially in scientific and technical fields of study. At the high school level, there must be increased attention on the reduction of drop-outs, because of the diminishing demand for nonskilled and semiskilled workers.

Systems Analysis and Educational Planning

Manpower planning is the best known and the most fully developed procedure for applying economics to educational planning. These models have been applied in many situations, here and abroad. A technology has been developed for their use, and comparative data are available. The procedures are readily understood by laymen and by educators, and the results can readily be translated into programs for legislation. For those who are concerned with occupational education, and with the supply and demand for qualified teachers, the models can be useful if their limitations are recognized.

Newer procedures are being developed which are based on systems theory, and which make much more use of mathematical formulations. The development of high speed computers makes these procedures relevant to problems of educational planning.

Systems theory recognizes that there are complex systems which cannot be described in their entirety. These systems (which include, as examples, the nation's economy, a biological organism, or a school system) need not be fully analyzed. Instead, it is possible to identify the relations between the system and its environment, and to classify them as inputs (environmental influences on the system) and outputs (system effects on the environment). These inputs and outputs can be observed and measured, and relations between them can be expressed in mathematical terms.[5]

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[5] For a brief description of systems analysis, see Beer (1964).

Table 2. Actual and projected employment, by major occupational group, 1960, 1965, and projections for 1970 and 1975, percent distributions, United States

Major occupational group	1960	1965	1970	1975
Professional, technical, and kindred workers	11.2	12.3	13.7	14.9
Managers, officials, and proprietors, except farm	10.6	10.2	10.3	10.4
Clerical and kindred workers	14.7	15.5	16.3	16.5
Sales workers	6.6	6.5	6.5	6.5
Craftsmen, foremen, and kindred workers	12.8	12.8	12.8	12.8
Operatives and kindred workers	18.0	18.6	17.5	16.7
Service workers, including private household	12.5	12.9	13.5	14.1
Laborers, except farm and mine	5.5	5.3	4.6	4.2
Farmers and farm managers, laborers, and foremen	8.1	5.9	4.8	3.9
Total employment	100.0	100.0	100.0	100.0

Source: U. S. Department of Labor (1966, p. 217).

Three applications of input-output analysis to educational planning are: (1) Tinbergen's econometric models; (2) linear programming; and (3) systems analysis of the internal economics of school systems.

Tinbergen's Econometric Models

Tinbergen developed a planning model which is intended to represent a link between economic development, and the development of a nation's educational system. While the approach is mathematical, it is similar in essence to the manpower planning models we refer to above. Tinbergen and Bos (1965, p. 10) point out:

> Our models do not aim at a description of the "free" development of the educational system under the forces of supply and demand, and, therefore, at forecasting such a development. Their aim is to describe the demand flows for various types of qualified manpower to be expected

> from the organizers of production and of education. The purpose of the models is to aid in the process of planning for education and for labor-market policies, tacitly assuming that ways and means can be found to induce the population to seek the desirable education.

The Tinbergen model uses a series of "coefficients" to represent the effect on enrollments in secondary and higher education of increases in the rate of a nation's economic growth. The effect of various assumptions about drop-outs, the use of foreign aid in the form of additional trained manpower, and various time factors for the production process is studied. The relationships are developed into a set of linear equations, which may be "solved" for the variables which are employed.

Unfortunately, there is little or no empirical background for these models, so that the coefficients which are used are strictly hypothetical. Furthermore, the model depends on some rather heroic assumptions concerning a "correct" number of individuals with given amounts of education at given time points, for given rates of economic growth. There is no evidence that the labor market is this rigid with respect to requirements. Furthermore, the model assumes that factor combinations, including teacher-student ratios, and educational productivity are fixed during the time period.

On the other hand, Tinbergen's approach is, in one way, more realistic than the approach of traditional manpower planning. He gives explicit attention to the processes of "transition" from one level of educational growth to another. The educational adjustments in the transition period are obtained by a process of solving equations.

Linear Programming

An improvement on Tinbergen's model would be an input output system which addressed itself to the production of education, and not merely to hypothetical relationships between the level of economic growth and the number of individuals needed, at each educational level. Samuel Bowles (1965) and others have developed such a model, using a technical process now in common use for solving industrial problems, known as *linear programming*.[6]

In introducing his study, Bowles refers to the educational system as an aggregation of production processes. These processes use a variety of human and physical inputs. Outputs are in the form of : (a) students who proceed to a higher level of education; (b) students who become teachers, and take part in the production of education; and (c) students who take jobs in the labor market after graduating.

Bowles' model is a variant of the rate of returns approach. His calculations are designed to determine the conditions under which the ratio of benefits to costs in maximized. Benefits, in his model, include the value of students' lifetime incomes, discounted to a base year, to form a present value. Costs include costs paid by the educational institution, and those paid by the student and his parents, with the exception of those costs, such as food and clothing, which would be incurred even if the student were not in school. His model recognizes the presence of limiting conditions, such as the supply of teachers of varying qualifications, and political limitations upon educational decision-making.

The advantages claimed for this model are the following (Bowles, 1965, pp. 12-13). First, it addresses itself to concrete planning problems. These problems include the appropriate enrollments at each level of education. They include, also, possible changes in educational technology, such as changes in the teacher-student ratio or the use of educational television. Finally, they include the all important problem of the total amount of money used by the educational system.

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[6] Also, see Irma Adelman, A Linear Programming Model of Educational Planning -- A Case Study of Argentina. Mimeographed, Johns Hopkins University, 1965.

In the second place, the model provides a means of studying the costs and benefits associated with various policy alternatives. For example, if a society decides to spend money improving technical education at the secondary level, rather than expanding its system of higher education, the economic implications of this decision can be studied by the linear programming model. In the third place, the model is much more flexible than the so-called manpower planning approach, since it allows for an economy characterized by a high degree of substitutability among different categories of labor, and between labor and capital.

In short, Bowles combined: (a) the mathematical models called linear programming with (b) the principle of constrained maximization and (c) the rate of returns approach to the study of policy alternatives in education. By these means, Bowles (1965, p. 2) was able to address himself to the following major educational problems:

> 1. The determination of the total amount of resource use. This requires comparing the rate of return to education with that in other sectors of the economy. Where rates of return to investment in education are above those in other industries, investment in education should be increased.
>
> 2. The distribution of the total resources among the different educational institutions or groups of institutions. The principle is similar to that applied in 1. In order to maximize benefits to society, expenditure should be increased in those institutions where they bring the highest rates of return.
>
> 3. The choice of production techniques in each producing unit. The rule here is that productive techniques which bring the greatest ratios of benefits to costs should be chosen.

4. The choice of importation versus domestic production of educated labor. Labor should be imported when the benefits to society of their efforts are greater than the costs of educating these individuals within the country. For example, if it is cheaper in a certain country to import doctors than to establish medical schools, economic rationality would require that doctors be imported. (Of course, native pride may demand a medical school -- this is a noneconomic criterion.)

Bowles stressed the fact that his model is purely an economic one, and does not include the noneconomic costs and benefits of education. Therefore, the results cannot in themselves form the basis of policy, since policy decisions should be made on the basis of various kinds of evidence -- social, political, humanitarian, and economic.

Bowles tested his model with data collected in Northern Nigeria. He found that it could be used with the relatively unsophisticated statistical procedures available in that country. It is noteworthy that he used educational, as well as purely economic, data. To provide a feel for the types of results which can be obtained in this manner, we list Bowles' main conclusions in the Northern Nigeria study (Bowles, 1965, Chapter 7):

(1) He found, unexpectedly, that expansion of primary education in Northern Nigeria could be justified on economic as well as on political grounds.

(2) He found low rates of return for secondary education and sixth form.

(3) He found that sixth form constituted a bottleneck, resulting in over-small university enrollments.

(4) He found that the net benefits of technical schools were not sufficiently great to divert additional resources to it and the craft schools which provide students with the necessary prerequisits.

(5) Activities importing graduate teachers and well-qualified non-graduates appear to be justifiable on economic grounds.

Other Models Using Systems Analysis

The procedures of systems analysis offer the possibility of a systematic examination of policy alternatives within educational systems. On the one hand, they permit structuring research results in ways which should be useful to educational decision-makers. On the other hand, they permit a systematic examination of the costs and benefits associated with policy alternatives in education (Kershaw and McKean, 1959).

Linear programming models can be developed which will use such educational data as achievement test results, as well as the more purely economic data. Intermediate production processes within educational systems, as well as the production of workers for the labor market, can be studied. In this way, organizational alternatives (such as team teaching), instructional systems (such as the man-machine systems created by educational television), allocation systems (such as the scheduling of students, teachers, space, and equipment) and transportation systems can be examined, and the costs and benefits of various alternatives can be evaluated.[7]

Finally, linear programming provides a method of analyzing problems which is useful, even in the absence of precise solutions. Developing the model requires a precise evaluation of inputs, outputs, constraints, and processes. It requires that decision-makers examine the kinds of data they have available, and the additional kinds of data which can be brought to bear on their problems. It enables them to look for feedback procedures, whereby the results of one set of decisions can be used to modify subsequent decisions. In short, it can help to integrate planning with current decision-making.[8]

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[7] For an empirical testing of the Kershaw-McKean analysis, see Thomas (1962).

Evaluation

In the United States, education is valued both as an end in itself, and as a means to other valued goals, such as economic growth, the elimination of poverty, and the renewal of the cities. Hence, education is demanded in unprecedented quantity and quality.

However, resources for satisfying this demand are limited. Education must compete with many other public and private goods (both investment and consumption) for the marginal dollar. Hence, attention is inevitably paid to the improvement of educational productivity.

Productivity improvements can only come about as a result of planning. Planning is needed to avoid the waste that comes from duplication of facilities, or other unwise use of resources. Planning is needed, in order that the schools and colleges may, in five or ten years from now, provide the kinds of manpower needed for a productive economy. Planning is needed, as well, so that resources can be allocated efficiently within the educational system, and so that all available knowledge will be used in the making of educational decisions.

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[8] For additional discussion of this topic, see J. Alan Thomas, The Productive School, to be published by John Wiley and Sons, Inc., New York.

Educational planning cannot proceed in a vacuum, but must be carried out in awareness of the needs and capacities of the total economy. It is therefore essential that manpower planning and educational planning be coordinated. However, the more sophisticated planning methods of the systems analysis variety can accomplish the goals of educational planning without all the restrictive assumptions of the manpower models.

We believe the state departments of education will increasingly establish divisions or bureaus of planning and development. Such divisions would be responsible for planning activities. They should include economists, in order that the tools of economic analysis may be available, and in order that educational planning be related to the economic capacities and needs of the states. Similar bureaus will no doubt be established in many of the nation's largest cities.

What would be the costs and benefits of planning divisions in state educational government? The benefits would lie in increased efficiency, or improved ratios of benefits to costs. Unplanned activities of the magnitude of a state's educational system are bound to be wasteful, both in terms of excessive costs and in terms of inadequate educational opportunities for the children of the state.

It would, of course, be impossible for anyone to actually measure the costs and benefits of planning, since planning changes the situation. The author of this paper was a member of a team of consultants in Ohio who recommended the establishment of a Division of Planning, there, at a suggested cost of $200,000 a year. This sum is about one-fifieth of one percent of the total cost of education in that state. The activities in which it would be engaged would, through improving educational efficiency in Ohio, pay for the cost of its operation many times over -- at least, in the opinion of the consulting team.

One of the advantages of linear programming is that it facilitates a continuing study of costs and benefits, and makes possible decisions which produce, at the margin, an increased ratio of benefits to costs. Hence, incremental decisions, each evaluated in this manner, can lead to a gradual improvement in the productivity of the entire educational system.

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PROGRAM

Convene in Skyroom
Dinkler Motor Hotel
Atlanta, Georgia

September 7, 1966

8:30 a.m.
Registration

9:00 a.m.
Morning Session
Chairman: Dr. Harry Beard, Associate Professor
Department of Rural Sociology and Education
North Carolina State University

Paper I
EDUCATIONAL INSTITUTIONS AND THE DEMAND FOR OCCUPATIONAL EDUCATION PERSONNEL, Dr. Charles H. Rogers, Assistant Professor, Department of Agricultural Education, North Carolina State University at Raleigh

Discussion

Paper II
EDUCATIONAL INSTITUTIONS AND THE SUPPLY OF OCCUPATIONAL EDUCATION TEACHERS, Dr. Merle Strong, Director, Program Services Branch, Division of Vocational and Technical Education, United States Office of Education

Discussion

12:00 a.m.
Lunch

1:30 p.m.
Afternoon Session
Chairman: Dr. Adger Carroll, Assistant Professor
Department of Economics
North Carolina State University

Paper III
SOME ASPECTS OF TEACHER SUPPLY AND DEMAND, Dr. John K. Folger, Director, Commission on Human Resources, National Academy of Sciences

Discussion

Paper IV
STAFFING JUNIOR COLLEGES, Dr. David G. Brown and Miss Edith Parker, Department of Economics, University of North Carolina

Discussion

4:30 p.m.
Adjourn for the day

September 8, 1966

9:00 a.m.
Final Session
Chairman: Dr. Loren Ihnen, Associate Professor
Department of Economics
North Carolina State University

Paper V
EDUCATIONAL PLANNING, AN EDUCATOR'S VIEW, Dr. Grant Venn, Bureau of Adult and Vocational Education, United States Office of Education

Discussion

Paper VI
EDUCATIONAL PLANNING, Dr. J. Alan Thomas, Midwest Administration Center, University of Chicago

Discussion

12:00 a.m.
Conference Adjournment

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